FIELD INSTRUCTIONS
FOR THE

INVENTORY
OF

THE PACIFIC ISLANDS

2014

Forest Inventory and Analysis Program

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THIS MANUAL IS BASED ON:

FOREST INVENTORY AND ANALYSIS

NATIONAL CORE FIELD GUIDE

FIELD DATA COLLECTION PROCEDURES FOR

PHASE 2 PLOTS VERSION 5.1

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1 INTRODUCTION

This manual documents the field procedures by the Forest Inventory and Analysis Program (FIA) in the inventory of the Pacific Islands.

FIA, a program within the Pacific Northwest Research Station (PNW), USDA Forest Service, is one of five Forest Inventory and Analysis work units across the United States. PNW-FIA is responsible for inventorying the forest resources of Alaska, California, Oregon, Washington, Hawaii, Guam, American Samoa, Republic of Palau, Federated States of Micronesia, Commonwealth of Northern Mariana Islands, and Marshall Islands.

1.1 Purposes of this manual

This manual serves two purposes, to:

- instruct field personnel in how to locate and measure field plots.
- document the field procedures, methods, and codes used in the inventory.

1.2 Organization of this manual

This manual is structured primarily for use by field personnel. Each chapter corresponds either to a separate function that must be performed in locating and measuring a field plot, or to a particular aspect of data recording that must be completed.

The procedures in this manual are ordered to coincide as much as possible with the order in which field data items are collected and entered into data recorders in the field, and the laptop data entry program. Some procedures and codes are repeated in multiple chapters of the manual to minimize the need to refer to additional chapters while collecting data in the standard order.

This manual incorporates the field data collection procedures of the Forest Inventory and Analysis National Core Field Guide with regionally specific procedures.

Information that is infrequently used or that is included only for documentation is in the appendices at the end of this manual. A glossary and an index are provided for quick reference.

**Text that is underlined is CORE text taken from version 5.1 of the National Core Field Guide. Shaded collection specifications below data items are also deemed CORE.*

Each section of the field guide begins with a general overview of the data elements collected at that level and background necessary to prepare field crews for data collection. Descriptions of data elements follow in this format:

DATA ELEMENT NAME -- <brief variable description>
When collected: <when data element is recorded>
Field width: <X digits>
Tolerance: <range of measurement that is acceptable>
Values: <legal values for coded variables>

Data elements, descriptions of when to collect the data elements, field width, tolerances, and values, apply to both Phase 2 plots (formerly called FIA plots) and Phase 3 plots (formerly called FHM

Detection Monitoring plots) unless specifically noted. Field width designates the number of columns (or spaces) needed to properly record the data element.

Tolerances may be stated in +/- terms or number of classes for ordered categorical data elements (e.g., +/- 2 classes); in absolute terms for some continuous variables (e.g., +/- 0.2 inches); or in terms of percent of the value of the data element (e.g., +/- 10 percent of the value). For some data elements, no errors are tolerated (e.g., PLOT NUMBER).

1.2.1 UNITS OF MEASURE

The field guide will use ENGLISH units as the measurement system.

1.2.3 PLOT DIMENSIONS:

Subplot - for selecting trees with diameters ≥ 5.0 inch (in)

Radius= 24.0 feet
Area = 1,809.56 square feet or approximately 0.04 acre or approximately 1/24 acre

Microplot - for counting seedlings and selecting saplings with diameters ≥ 1.0 inch (in)

Radius = 6.8 feet
Area = 145.27 square feet or approximately 0.003 acre or approximately 1/300 acre

The distance between subplot centers is 120.0 feet horizontal.
The minimum area needed to qualify as accessible forest land is 1.0 acre.
The minimum width to qualify as accessible forest land is 120.0 feet

Tree Limiting Dimensions:

breast height	4.5 feet
stump height	1.0 feet
merchantable top	4.0 in DOB
merchantable top for woodland	1.5 in DOB
minimum conifer seedling length	0.5 feet
minimum hardwood seedling length	1.0 feet
seedling/sapling DBH break	1.0 in DOB
sapling/tree DBH break	5.0 in DOB

1.2.2 GENERAL DESCRIPTION

The CORE field plot consists of four subplots approximately 1/24 acre in size with a radius of 24.0 feet. The center subplot is subplot 1. Subplots 2, 3, and 4 are located 120.0 feet horizontal (+/- 7 feet) at azimuths of 360, 120, and 240 degrees, respectively, from the center of subplot 1 (see Figure 3.1). Throughout this field guide, use of the word “plot” refers to the entire set of four subplots. “Plot center” is defined as the center of subplot 1.

Subplots are used to collect data on trees ≥ 5.0 inches.
Each subplot contains a microplot of approximately 1/300 acre in size with a radius of 6.8 feet. The center of the microplot is offset 90 degrees and 12.0 feet horizontal (+/- 1 foot) from each subplot center. Microplots are numbered in the same way as subplots. Microplots are used to select and collect data on saplings (DBH of 1.0 inch through 4.9 inches) and seedlings [DBH less than 1.0 inch in diameter and greater than 0.5 foot in length (conifers) or greater than 1.0 foot in length (hardwoods)].

Each unit may choose which Phase 3 indicators to collect as core optional on a Phase 2 plot that is not a Phase 3 plot. They may choose no indicators, all indicators or a subset. If they choose to collect data for a Phase 3 indicator, all the procedures for the indicator must be followed for that indicator to be considered core optional (data in National NIMS). If a subset of measurements for an indicator are collected, that is considered a regional enhancement and the data will be in the regional database. Data are collected on field plots at the following levels:

Plot- Data that describe the entire cluster of four subplots.

Subplot- Data that describe a single subplot of a cluster.

Condition Class- A discrete combination of landscape attributes that describe the environment on all or part of the plot. These attributes include CONDITION CLASS STATUS, RESERVED STATUS, OWNER GROUP, FOREST TYPE, STAND SIZE CLASS, REGENERATION STATUS, and TREE DENSITY.

Boundary- An approximate description of the demarcation line between two condition classes that occur on a single subplot or microplot. There is no boundary recorded when the demarcation occurs beyond the fixed radius plots.

Tree- Data describing saplings with a diameter 1.0 inch through 4.9 inches, and trees with diameter greater than or equal to 5.0 inches

Seedling- Data describing trees with a diameter less than 1.0 inch and greater than or equal to 0.5 foot in length (conifers) or greater than or equal to 1.0 foot in length (hardwoods).

1.2.3 PLOT SETUP

Plots will be established according to the regional guidelines of each FIA unit. When the crew cannot occupy the plot center because safety hazards exist, or the plot center is inaccessible or out of the sample, the crew should check the other subplots. If any subplot centers can be occupied and are in the sample, the subplots that can be occupied should be established and sampled following normal procedures (See section 3.7). When a subplot center or microplot center cannot be occupied, no data will be collected from that subplot or microplot; instead, the entire subplot or microplot should be classified according to the condition preventing occupancy.

The following table provided can assist in locating subplot 2-4 from a subplot other than subplot 1.

Subplot From	Numbers To	Azimuth *degrees*	Backsight	Distance *feet*
2	3	150	330	207.8
2	4	210	030	207.8
3	4	270	090	207.8

If a subplot was installed incorrectly at the previous visit, the current crew should remeasure the subplot in its present location and contact the field supervisor. In cases where individual subplots are lost (cannot be relocated), use the following procedures:

Assign the appropriate present CONDITION CLASS STATUS Code(s) to the new subplot (usually CONDITION CLASS STATUS = 1 or 2)

Assign TREE STATUS = 0 to all downloaded trees (i.e., incorrectly tallied at the previous survey).

Assign RECONCILE codes 3 or 4 (i.e., missed live or missed dead) to all trees on the new subplot.

Assign the next TREE RECORD NUMBER.

1.2.4 PLOT INTEGRITY

Each FIA unit is responsible for minimizing damage to current or prospective sample trees and for specifying how these trees are monumented for remeasurement. The following field procedures are permitted:

Scribing and nailing tags on witness trees so that subplot centers can be relocated.

Boring trees for age on subplots and annular plots to determine tree age, site index, stand age, or for other reasons.

Nailing and tagging trees on microplots and subplots so that these trees can be identified and relocated efficiently and positively at times of remeasurement.

Nailing, scribing, or painting microplot and subplot trees so that the point of diameter measurement can be accurately relocated and remeasured.

All other potentially damaging procedures that may erode subplot integrity are prohibited. **The following practices are specifically prohibited:**

Boring and scribing some specific tree species that are known to be negatively affected (i.e., the initiation of infection or callusing).

Chopping vines from tally trees. When possible, vines should be pried off trunks to enable accurate measurement. If this is not possible, alternative tools (calipers, biltmore sticks) should be used.

1.3 Products

PNW-FIA provides information needed by resource planners, policy analysts, and others involved in forest resource decision-making. Data collected in PNW-FIA inventories is summarized, interpreted, analyzed, and published in statistical and analytical reports of national, state, and subregional scope. PNW-FIA publishes information on area by forest land and owner classes, land use change; timber volume, growth, mortality, and removals; potential forest productivity; opportunities for silvicultural treatment; and kind and area of wildlife habitats. PNW-FIA also provides data to answer questions about forest resources.

1.4 Research topics

The data collected in these inventories represent a wealth of information for both applied and basic questions concerning forest ecosystems. Topics include: the distribution of plant species and their relationship to environment, the incidence of insects and disease in relation to FOREST TYPE/community and condition, changes in forest due to disturbance, and improved prediction of forest growth and development on different sites and in response to management.

2 TRAVEL PLANNING AND LOCATING THE PLOT

2.1 Landowner contact

2.1.1 PERMISSION

Written or verbal landowner permission must be obtained before a plot is visited. This responsibility lies with the field coordinator who may delegate contacting the landowner to the field crew.

2.1.2 RECORDING CONVERSATIONS WITH LANDOWNERS

Include a record of each conversation with a plot landowner on the Ownership Contact form. While not a part of the official plot record, this information will document that permission was obtained, assist in accessing the area for variance-plots, and possibly aid the field crew during a future inventory.

Ask landowners if they can confirm the dates of any treatments or disturbances (usually harvesting) on the plot since the previous visit; record this date on the Plot Card and in Condition Class Data if requirements are met. Record any special circumstances about plot accessibility--such as locked gates or washed-out roads on the Plot Card.

2.1.3 DATA REQUESTS

Plot specific data is released only to the legal owner of the plot area. Requests for photocopies of the field data sheets, Plot card, summarized plot data, and for copies of future publications based on information collected in this inventory should be noted on the Plot Card and recorded with LANDOWNER PLOT SUMMARY REQUEST in the data recorder. Current plot data will generally be sent to the owner after the field season is completed and plots are returned to the office. If the landowner desires, the crew may provide photocopies of plot data immediately after collection.

Any additional data requests should be referred to the client request person in the Anchorage office:

Ray Koleser
Anchorage Forestry Sciences Lab — phone: (907) 748-9416
161 E 1st Ave. Door 8 — email: rkoleser@fs.fed.us
Anchorage, AK 99501

2.2 Before leaving base camp

1. Make sure the landowner has been contacted (see above).
2. Plan the route to the plot. Always bring two or more extra plots.
3. Leave word of plot locations and expected destinations with the crew coordinator using the arranged system (cell phone, voice mail, etc.).
4. Make sure your vehicle has all of the necessary field gear and a plot map.
5. Be in agreement with your crew partner(s) on a work procedure.
6. Inspect vehicle for fuel, oil, lights, safety features, and plot supplies (stakes, tags, pins, and nails) prior to departure.

2.3 Checklist of items needed on plot

2.3.1 DATA RECORDING ITEMS
Previous plot records and photos
Plot jacket (previous and current plot records with subplot diagrams, and field photos)
Hand-held data recorder downloaded with plot records; extra AA batteries
Handheld GPS unit with fully-charged batteries (bring extra batteries)
Survey Grade GPS unit (if needed on that plot for the day)
Mechanical pencils, red photo pen, black pen, eraser
Note pad(s) made of "write-in-the-rain" paper
Blank forms for plot, subplot, condition class attributes; tree tally; veg profile; and subplot diagram
Calculator(s)
Tatum
Field procedures manual
Plant ID guide(s), plant association guides, plant disease guide

2.3.2 PHOTO INTERPRETATION ITEMS
Plot (road) map
Stereoscope(s) (2x and/or 4x) with case and sharp straight pins
Photo scale (Timber Survey Aid #16)
6 inch ruler calibrated in 1/20th inches
Hand lens

2.3.3 PLOT MEASURING ITEMS
Compass (es)
Clinometer(s)
Diameter tape(s)-20 foot
Increment borer(s) with sheath
100 foot tape(s) with carabineer(s)
Hand axe(s) with sheath
Laser height/rangefinder
Plant press or plastic bags for plant specimens

2.3.4 PLOT REFERENCING ITEMS
Steel plot pins
Aluminum nails
Tree number tags
Square aluminum tags
Round aluminum tags
Flagging tape

2.3.5 FIRST AID ITEMS
First aid kits
Bee sting kits

2.3.6 PERSONAL AND SAFETY GEAR
Canteens with water
Lunches
Utility pouch
Vest and hardhat
Rain gear
Gloves
Flashlight and batteries

Extra clothing
Extra food
Iodine tablets
Headlamps

2.3.7 CAMPING GEAR WHEN APPLICABLE:

Tarps
Extra water or water purifier
Stove with fuel and matches
Food
Cooking/eating dishes
Flashlight
Hammock tent
Camping backpack

2.4 Safety

Personnel working in the field are subject to many safety hazards. Each person must always be conscious of these hazards to avoid accidents:

1. **Don't take chances!**
2. **Eliminate horseplay and carelessness!**
3. **Think safety!**
4. **No task is more important than personal safety!**
5. **Always make sure that someone else knows where you plan to work each day!**

2.4.1 SAFETY IN THE WOODS

Wear protective clothing: Long-sleeved shirts, long pants, and gloves may protect you from contact with brush, rocks/coral and stinging/biting insects. Trouser legs should be loose enough to avoid binding or cramping, and should not have cuffs. Wear a hardhat at all times in the woods.

Wear good quality boots that provide good support and traction. For example: 8-inch high leather work boots with lug-soles (Vibram-type soles).

Walk, don't run in the woods. Take your time and plan your route. Avoid plunging through the brush. The best route of travel may not be the shortest. Routes across brushy, irregular terrain with rocks and down logs can be hazardous.

Be watchful of twigs and branches, which may cause eye injury. Be especially alert when stepping up to trees which retain their small dead twigs. Keep a sufficient distance between you and the person ahead of you to avoid being slapped by branches.

Lift knees high to clear obstacles in heavy undergrowth or slash. Slow down and watch your step.

When contouring a steep slope, do not lean into the hill. This tends to loosen footing. Erect posture or slightly leaning out gives more secure footing.

Know how to fall to avoid hard impacts. Keep flexible with knees slightly bent. If you feel yourself slipping, pick a landing spot. Do not stick your arms out to break a fall. Roll with the fall. Try to take the impact on the side of your body rather than your back.

Don't take chances by walking across ravines on small logs.

Bee aware. Keep an eye out for yellow jacket and hornet activity. Yellow jackets nest in the ground, often in well-decayed logs or in thick moss on trees or in snag cavities. Yellow jackets are particularly active (nasty) during late summer and early fall when forest conditions are very dry. Hornets' nest above ground in "paper" nests that are suspended from branches; woe befalls those who unwittingly bump their head against a nest, or shake the sapling from which a nest is suspended. If allergic to insect stings, carry medication to counteract the effects of stings.

Avoid poisonous plants/animals, if possible. After contact with toxins, remove clothes carefully, wash exposed areas with cool, soapy water, and wash clothes before wearing them again.

Keep someone posted as to where you plan to work each day, particularly on long hikes into the forest, so that if you do not return in a reasonable time, someone can find you.

Keep hatchets in their sheath except when actually using them, and snap the sheath shut.

First Aid. Keep your individual first-aid kit completely supplied, and know how to use it. Treat all wounds promptly.

Carry matches and possibly a small flashlight. On very long hikes, take extra food, clothing, and matches in case you are caught out in the woods at night. Never build fires in forest duff or leave a campfire until it is dead out.

Check for ticks. The beasties bite and can carry Lyme disease. (not usually encountered in Pacific Islands)

Carry plenty of water. Don't expect your partner to carry water for you.

Beware of lightning. Watch for approaching storms. Avoid prominent high exposed ground and tall/lone trees. Abandon field gear, especially that which is made of metal. Seek shelter in the vehicle if possible, otherwise in thick timber, large caves or in valley bottoms. Crouch on the balls of your feet with your head covered. Separate 100 feet from other crew members.

Safety on the road

It all pays the same, so drive with care, with courtesy, regardless of others' actions, and with common sense. Follow these tips:

Seat belt use is required by all government employees, volunteers, and contractors. Do not ride in the back of pickups.

DRIVE DEFENSIVELY! Expect the other person, whether a vehicle operator or a pedestrian, to do the worst thing and be prepared. Observe all speed regulations and traffic signs.

Do not drive when sleepy, taking medication, or when other personal conditions make it unsafe to drive a vehicle. Get someone else to drive or, if alone, stop driving and nap (out of the public view).

Always drive with your headlights on. This practice increases the visibility of your vehicle. It is particularly important when driving in fog, on dusty roads, traveling in and out of shadows, and any other low light/visibility situations. Turn lights off when you park the vehicle.

Do not operate a vehicle in an unsafe condition. Check your vehicle frequently to keep it in good mechanical condition. Lights, horn, steering, and brakes should be kept in proper adjustment at all times. Make necessary repairs as soon as unsafe condition develops. Report any unsafe conditions to your supervisor.

Keep the vehicle clean. Windows, mirrors, and lights should be kept clean and free of obstructions to increase visibility. Keep the cab and driver area clean so material is not rolling under pedals or distracting the driver.

Shift to a lower gear at the beginning of a grade, if the grade is a long, steep descent.

Adjust vehicle speed to the driving conditions. Wet, icy, or snowy roads and decreased visibility require decreased speed. Be aware of speed when changing from one type of road to another, i.e., Freeway to secondary highway to gravel and adjust speed accordingly.

Don't tailgate. Allow at least three seconds of travel distance between yourself and the vehicle ahead. Under slippery road conditions and poor visibility, allow more distance.

Be aware of your vehicle's idiosyncrasies and adjust your driving accordingly.

Be alert for heavily loaded trucks moving at high speeds when driving on privately-owned log-haul roads. Observe all traffic control signs, particularly signs requiring you to drive on the left side of the road.

Back up safely. Walk around your vehicle to check for hazards before backing and use a spotter to guide you.

Do not drive and navigate at the same time. If the driver needs to look at maps and photos, stop at a safe place, then look at them.

Watch for animals on the road. Most hoofed animals travel in groups, so where there is one, assume there are many, with all just itching to jump out in front of your vehicle. Stop and let the animal move off the road, look for others to follow, then proceed on. If you cannot stop in time to avoid hitting an animal, it is generally better to hit it, than to go off the road or hit another vehicle.

Park the vehicle so that it is not a hazard to other drivers. Do not park where dry grass or other potential fuels can come in contact with your vehicle's hot exhaust system.

Keep as far right as is safely possible on blind curves on logging roads. If the curve is blind and less than two lanes wide, slow way down and be ready to take evasive action.

Yield to uphill vehicles on roads wide enough only for one vehicle.

2.4.2 WHAT TO DO IF INJURED

Treat the injury promptly. If immediate medical attention is required, go directly to a hospital emergency room. Try to make contact with your supervisor or the office to get instructions and assistance. Make sure the doctor fills out his/her part on the CA-1 form.

Inform your supervisor of all injuries and ask which, if any, forms need to be filled out. Supervisors must inform the office at the earliest opportunity.

Fill out Federal accident forms completely with signatures. ALWAYS make a copy for your personal records. Give the completed forms to your supervisor. Have the supervisor check your entries for mistakes, fill out their section, and forward the completed forms to the appropriate person.

Gather Information. If you are in a multi-vehicle accident, provide the other parties with enough written information so that they can easily get in touch with you, your crew supervisor, and the office. In turn, you must get the following information from all involved parties and witnesses -- names, addresses, phone numbers, vehicle license numbers, driver's license numbers, insurance company names and policy numbers, and police report numbers. If possible, do not admit responsibility without first contacting your supervisor.

2.5 Plot location aids

Each field crew should have a road map with the location of the plots marked and a plot packet for each plot you may visit. The plot packet for each field plot will generally contain old and new photos, previous plot records with plot diagrams, current computer-printed Plot, Subplot, and Condition Class Attribute records, computer-printed current tree tally records, and a plot review sheet.

Use the road map, plot cards and aerial photos from the previous inventories to locate the plot. The county, plot number, and plot coordinates are printed on the Plot Attribute record. Plot locations are marked and numbered on the road map. Use the road map to reach the general vicinity of the plot by motor vehicle. Once you are within the area covered by the photos, you may use the photos to find the exact plot location on the ground.

2.6 Plots not previously visited

These plots will have new aerial photos with the field grid location pinpricked on them. Some plots may also have coordinates obtained by digitizing USGS topographic maps or by some other means.

2.7 Locating the plot on the ground

2.7.1 LOCATING AN ESTABLISHED PLOT

Established plots include:

- Annual inventory (P2) remeasurement plots (SAMPLE KIND = 2, Section 4.3.12)

The first step in relocating a previously established plot is to find the ground location of plot center (PC) marked on the photos; use resources such as photos, maps/drawings, written descriptions, GPS coordinates (Section 4.5), and reference point (RP) data. Each field crew should have a map with the location of the plots marked and identified with the plot number, and a plot jacket for each plot that may be visited. The county, plot number, and plot coordinates are printed on the ownership label on the plot jacket. Use the available resources to reach the general vicinity of the plot. All previously established plots should have an RP from which a slope distance and azimuth to the PC was recorded. This distance and azimuth can be followed from the RP to relocate the PC.

When a previously established plot is difficult to find use the following procedures to re-establish the plot for remeasurement:

- If no trees exist: Use photos, maps, and GPS to verify plot location and treat plot as remeasurement.
- If a major disturbance has occurred with no trees or monumentation remaining: Use photos, maps, and GPS to verify the plot location and consider it a remeasurement plot.

- If some monumentation is present, but not all the trees are found: The plot should be re-established and remeasurement protocol followed.

2.7.1.1 NAVIGATING WITH PHOTOGRAPHY

The plot jacket for each field plot will usually contain photos, supplemental imagery, and maps. The plot center is pinpricked and circled on the old photos. Photo pinpricks must be transferred onto new photos without error. Use both new and old photos to proceed to the plot area when revisiting established plots.

Some photos will be marked with a point-of-departure (POD). They are usually near a road and indicate how the crew approached the plot at a previous visit. In some cases, it may be easier to locate an established plot by heading directly to the plot rather than to the RP because within the plot area there may be numerous "signs" to detect (e.g., trees with reference tags, tree numbers, diameter nails). In searching for the plot, you may find a tagged/numbered tree on one of the subplots, use the plot data from previous visits to determine which subplot you are on.

2.7.1.2 NAVIGATING WITH GPS

Plots visited previously will, in most cases, have field collected GPS coordinates. When using GPS coordinates to navigate, ensure coordinates are entered accurately into the GPS unit using the correct datum and follow your progress on the photo. Compare the GPS navigation readings to other plot location data such as RP to PC distance and azimuth to confirm direction of travel.

If during GPS navigation to the plot you encounter anything that could affect a future crew's travel or safety (e.g., passage around cliffs, shallow stream crossings, illicit activities, game trails, etc.) create a waypoint. Record the waypoint coordinates (Section 4.5) and provide an explanation in the electronic GPS NOTES. Refer to Appendix 4, GPS Operating Guide, for operation instructions for specific GPS units used by PNW.

2.7.1.3 NAVIGATING WITH REFERENCE POINT (RP) DATA

Reference points have been established on most previously visited plots; slope distance and azimuth from the RP to the PC were recorded. On some plots, the previous RP referenced a subplot center other than subplot 1, the pinpricked location; on these plots, the plot center monument was still installed at the pinpricked location. See Section 2.7.1 for monumentation details.

Species, diameter at breast height (DBH), azimuth from RP to PC, and slope distance from RP to PC, were recorded on the plot card and on the photo used at the previous visit, and will be in the previous data printout.

The RP will be monumented with square aluminum tags (non-tree RP monumentation will vary). An RP tree will have three square aluminum tags; two at approximately six feet above ground (facing crew's approach), and one below stump height (facing plot center).

Though measuring the distance and azimuth from the RP to the PC may be time consuming, if done carefully, it is a reliable method for relocating field plots.

Before measuring from the RP to the plot center, check photos to see if the azimuth and distance seem reasonable. If reliable GPS coordinates exist, GPS distance and azimuth can be compared to RP data distance and azimuth.

2.7.1.4 REVERSE REFERNCE POINT (RP) METHOD

If the RP cannot be found, but the plot center is found, locate a new RP after remeasuring the plot (time permitting). The tree/object selected should be visible on the photo, preferably between the POD and PC. Record new RP data using the following methods:

- If GPS coverage is very good, collect coordinates for the new RP. Use the navigation function on the GPS receiver to get an azimuth and horizontal distance from the new RP to the collected PC coordinates. Record all the usual RP data in the RP section of the plot card and label them "GPS" to indicate that azimuth and horizontal distance were not measured with a compass and tape. These data must also be entered into the data recorder. Pinprick the new RP on the best photo available and record the RP data on the back of the photo; label these data with the method (GPS) used to determine the azimuth and horizontal distance to the new RP.

- If GPS coverage is poor, pinprick the location of the new RP on the best photos available (same photos as the PC pinprick). Use the methods in section 2.7.1 (Locating Plots Using Photos) to determine the horizontal distance and azimuth from RP to PC. Record all the usual RP data on the plot card, in the data recorder, and on the back of the photo.

2.7.2 ESTABLISHED PLOT ISSUES

See Section 2.7.1, Locating an Established Plot, for definition of established plots.

2.7.2.1 DIFFICULTY FINDING ESTABLISHED PLOTS

If an established plot cannot be found, follow these steps:

1. Return to the last known point on the route to the plot. Plan a route to the pinpricked plot center; divide the route into stages with a physical feature at the end of each stage which can be identified on the photos and confirmed on the ground. Proceed, stage by stage, confirming the endpoint of the previous stage before proceeding to the next. The endpoint of the last stage should correspond with the pinpricked location, and be monumented with a center stake and witness trees/snags/stumps/objects. If the plot cannot be found, continue with the following steps.
2. Look for stream confluences, ridges, openings, groups of large trees, old skid roads, large snags, etc. on the ground, to confirm you are at the pinpricked location.
3. Try to locate the area where previous crews might have been when they thought they were at the pinpricked location. Check the previous plot card for remarks providing insight on plot location such as: "Plot center moved back 20 feet on same azimuth to agree with photo pinprick". Look for other indicators such as:
   - Stand type and size of trees
   - The size and species of the RP and subplot 1 witness trees
   - Direction of travel from the RP (it could be 180 degrees off)
   - Slope and aspect
4. Previous plot access information (Route to RP and RP Information) should be compared with the original photo pinprick. If these two plot references do not correlate to the same location:
5. Begin a spiral search from where the RP to PC traverse ended; extend up to a 500-foot radius around the ground location.
6. At the same time, use all photos, drawings/maps, previous data, and/or GPS coordinates to aid in relocating.

7. If the ground location of the pinprick is found then begin a spiral search of that area, extending up to a 500-foot radius.
8. If no sign of the plot can be found after an extensive search (of a maximum of two hours) using all the data and tools available, the plot will be considered lost. See Section 4.1, Lost Plot/Replacement Plot.

2.7.2.2 INCORRECTLY INSTALLED PLOT

Incorrectly installed plots will be relocated or remeasured based on the following criteria:

Remeasurement (SAMPLE KIND = 2): Plot is remeasured where it was installed at the previous annual visit, regardless of location errors (i.e., incorrect initial plot location). In this situation, pinprick the actual plot center location on the photos and label the new pinprick on the back of the photo (e.g., “actual plot location”); draw an “X” over the previous pinprick and label (e.g., “initial pinprick location–plot not installed here“). Electronic PLOT NOTES (Section 4.3.26) must be recorded, and a written explanation/description included on the plot card.

2.7.2.3 INCORRECLY INSTALLED SUBPLOT OR MICROPLOT

Subplots and microplots are remeasured where they were installed at the previous annual visit, regardless of installation error (see Section 3.9, Plot Establishment Tolerances). When a subplot or microplot center is determined to be installed incorrectly, electronic SUBPLOT NOTES Section 6.1.17) must be recorded documenting why the installation was in error and a written explanation included on the plot card.

2.7.2.4 PC STAKE OR SUBPLOT/MICROPLOT PIN MISSING OR MOVED

If the PC stake or a subplot/microplot pin is missing or has moved, re-establish the PC stake, subplot pins, or microplot pin at the previously established location using all available information (e.g., previous crew's data sheets, plot card diagrams and descriptions, downloaded tree data in PDR, and any monumentation on the ground). The location of the plot center stake and subplot pins is critical for ensuring that trees do not arbitrarily move in or out of tally between surveys. When a crew has exhausted all efforts to find the PC stake or subplot/microplot pin, use the following guidelines to re-establish plot/subplot/microplot center and provide details of the reinstallation in electronic SUBPLOT NOTES and on the plot card:

1. If the PC stake or a subplot pin is not in the previous location (i.e., pulled out of ground or moved) or is missing:
   - Locate the witness trees and any trees that are located nearest to the limiting distances of 24.0 feet. Use the slope distances and horizontal distances of these trees to ensure proper stake or pin re-establishment.
   - To ensure optimal precision, the crew should measure out the previous slope/horizontal distances along the back-azimuths from the trees nearest the limiting distances to where PC or subplot center should be. The location where the measured distances converge should be the re- established stake/pin position.
   - If the measured distances do not intersect at one point after verifying the distances and back- azimuths, re-establish the stake/pin at the average point, and record the discrepancies in the electronic SUBPLOT NOTES.

   For example: Tree A has a horizontal distance of 23.4 feet and a back-azimuth of 270 degrees. Tree B has a horizontal distance of 23.2 feet and a back-azimuth of 90 degrees. Although the measuring tapes extending from the two trees should meet at center, there is a gap of 0.4 feet between them. Re-establish center at the average point between the two tapes, and record the details of the reinstallation in electronic SUBPLOT NOTES.

2. If the microplot pin is not in the previous location (i.e., pulled out of ground or has moved), or is missing:
   - Locate any previously tallied saplings using the printout and downloaded data in the PDR. Locate saplings on the edge of the 6.8-foot limiting distance and use them to re-establish the center of the microplot.
   - If there is only one tally sapling on the microplot, measure out 12 feet at 90-degrees from subplot center to temporarily mark the location of microplot center. Measure back to this location from the pith of the sapling using previous distance and azimuth and re-establish the microplot pin based on the temporary pin location and previous tally sapling data.
   - If there are no tally saplings on the microplot, re-establish microplot center 12 feet from subplot center at 90-degrees.

2.7.2.5 LOST SUBPLOT

When an individual subplot is lost (cannot be relocated), re-establish the subplot center pin. CONDITION CLASS STATUS (Section 5.6.3.4) of the new subplot must be updated (if necessary) and previous tree data must be reconciled. See Section 8.4, Tree Tracking, for specific instructions for closing out downloaded tree records on lost subplots.Record details of the lost subplot and procedures used to reinstall the pin in electronic SUBPLOT NOTES and on the plot card. Record specific notes pertaining to the tree tally in the individual TREE NOTES.

2.7.2.6 LOST PLOT (REPLACEMENT PLOT)

If a previously established annual inventory (4-subplot design) plot (SAMPLE KIND = 2) cannot be found in about 2 hours using all the data and tools available, the plot is considered lost; certain procedures must be followed to “close out” the old (lost) plot and replace it with a new plot. See Section 4.1, Lost Plot/Replacement Plot, for specific procedures.

2.7.3 LOCATING NEW PLOTS

Locating a plot by inspection: For plots not previously established use the new photos to proceed to the pinpricked location by photo interpretation. When you reach the point you believe is the pinpricked location, carefully check the pinpricked field grid location on the new photos against the surrounding terrain and pattern of tree crowns and vegetation to confirm that the pinpricked location on the photo and your location on the ground are exactly the same spot. In some cases you may be able to navigate to the plot center using the GPS receiver then pinprick the aerial photograph after confirming your location as described above.

Locating a plot with an RP (Section 3.5.2, the reference point,) and baseline: You may encounter a plot that is difficult to locate using photo interpretation. In this case you may establish a baseline on the photos to determine true photo azimuth and scale. Once the baseline is established:

1. Select, tag, pinprick, and record a RP, preferably within 500 feet of the plot. (See: Section 3.5.2, the reference point).
2. On the photos, draw a straight line between the RP and pinpricked location.
3. Determine the azimuth and distance from the RP to the referenced subplot.
4. Measure out the calculated azimuth and distance to the referenced subplot. Locate the field grid location which is the center of subplot 1 on the standard layout to begin the plot. If a new plot, carefully check the photos against the surrounding terrain and vegetation to make sure you are actually at the field grid location pinpricked on the new photo.

2.8 Plots with active logging

If the plot area is being logged (timber is being felled, bucked, or yarded) or is unsafe to visit because of active logging, DO NOT ESTABLISH THE PLOT. Note on the plot jacket the status of the logging operation and return the plot to the supervisor. The supervisor will hold the plot until later in the season, when the status of the logging operation will be checked again to see if the plot can be completed.

2.9 Denied access plots

If access is denied to the field grid location or a portion of a plot, see Section 3.2, "Noncensus Water, Census Water, Nonsampled".

2.10 *Plot location Tolerance*

Plot location
Tolerance: Remeasured plot: N/A – plot is relocated
New plot: located +/- 30.0 ft.
Aerial photograph
Tolerance: Previous and current pinpricks in correct spot: +/- 1 mm. 100% of the time

3 PLOT LAYOUT AND REFERENCING

3.1 Plot layout at the current annual inventory

In the current annual inventory the 4 subplots are laid out in the pattern below across condition classes. Subplots are **never** "substituted" or "moved" in order to keep the entire subplot within a condition class.

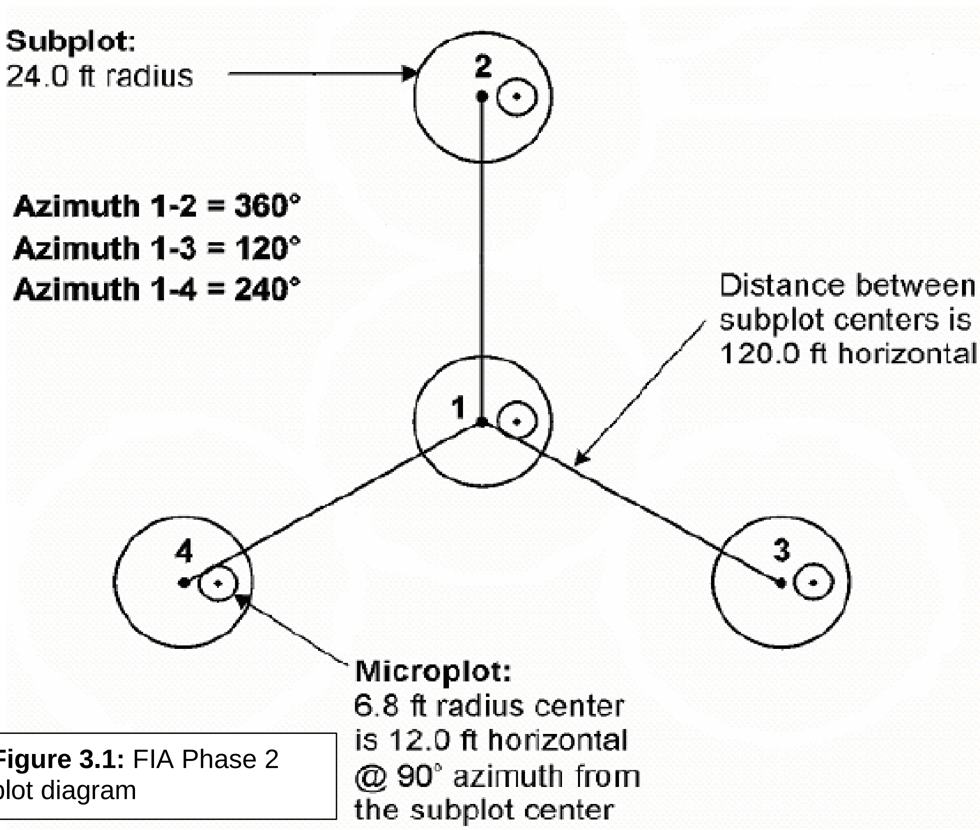


Figure 3.1: FIA Phase 2 plot diagram

<u>The following table can assist in locating subplots *2 through 4* from a subplot other than subplot 1</u>

Subplot Numbers		Azimuth	Backsight	Distance
From	To	Degrees		Feet
2	3	150	330	207.8
2	4	210	030	207.8
3	4	270	090	207.8

3.2 Noncensus water, Census water, Nonsampled

At the current inventory for all subplots (including subplot 1 - plot center)

1. If a subplot center lands in accessible forest land or accessible nonforest land, then any Noncensus water, Census water, or Nonsampled (Denied Access, Hazardous, etc.) condition classes are mapped as separate condition classes. Measurements are taken only in any accessible forest land condition classes and accessible nonforest condition classes when nonforest is being sampled.
2. If a subplot center lands in Noncensus water, Census water, or Nonsampled areas (Denied access, Hazardous, etc.), the subplot will not be installed or referenced. The entire subplot is classified as the subplot center condition, even though a portion of it may be in another condition class. Other subplots are installed using normal procedures.

   See chapter 5 on Condition Class for further instructions.

3.3 Recognition of condition classes

Each plot area recognized within an inventoried area is divided into condition classes. The area within each subplot's 24.0 foot fixed-radius is mapped using these condition classes. Condition classes are first defined by differences in condition status. Some of these condition classes may be further subdivided by other attributes. The condition class in which the field grid location lies (the center of subplot 1) is always condition class 1. While most subplots encompass only one condition class, some will have two or more classes within their 24.0 foot radius.

Condition classes are determined in three steps:

1. Plot area is divided into condition classes based on differences in condition status.
2. Accessible forest land condition classes are further divided by differences in 6 mapping variables.
3. Nonforest land condition classes are further divided, in some cases, by differences in nonforest land use.

See chapter 5 on Condition Class for complete instructions.

3.4 Subplot numbering

Install the four subplots in the configuration described above. The subplots are labeled #1, #2, #3, and #4.

All condition classes present on the subplot (within the 24 ft. fixed radius) are mapped on the plot diagram. In accessible forest land and measured nonforest condition classes, trees, snags, saplings, seedlings, and understory vegetation are measured. These data are not measured or collected in any other type of mapped condition classes.

3.5 Referencing the plot

3.5.1 REFERENCING PLOTS NOT VISITED PREVIOUSLY

If the plot has not been visited previously, the field grid location was pinpricked on the new field photos prior to field visit. The pinprick is marked on the photos with a nearby red dot.

Do the following steps:

1. Find this pinpricked field grid location on the ground. (The location will become the center of subplot 1 on the standard layout).
2. Install a center pin at this location on the ground. Check to see that "An exception" listed below does not apply.
3. Reference the new stake to nearby two trees; see "Referencing the center pin"(see section 3.5.3).
4. Reference the new stake to an RP; see "The reference point (RP)" below.
5. Circle the pinprick in pencil on the back of the photo and write "PC" (plot center) and the plot number near the circle.
6. Determine and pinprick the ground location of the RP on the new photos using photo interpretation. Circle the pinprick in pencil on the back of the photo and write "RP" near the circle.

An exception

The center pin is not placed at the field grid location of subplot 1 if either of the following situations occur:

1. the center of subplot 1 is too hazardous to visit (examples: subplot center 1 is in the middle of a pond, or the middle of a freeway, or on the side of a cliff) **OR**
2. placing the center pin at the center of subplot 1 is very apt to irritate a landowner (example: subplot center 1 is in the middle of someone's front lawn).

If the exception applies, reference the center of the lowest-numbered subplot on the standard layout on which the above exceptions do not apply. *Record and electronic PLOT NOTE stating which subplot was monumented with the center pin.*

Specifically, do the following steps:

1. Place a center pin at the center of this subplot,
2. Reference the new stake to two nearby trees (see section 3.5.3, "Referencing the center pin").
3. Reference the new stake to an RP; see "The reference point (RP)" below.
4. If a revisited plot, <u>determine and pinprick the location of the field grid location</u> on the new photos using photo interpretation. All plots: use a photo marking pen to circle the pinprick on the back of the photo and write "PC" (plot center) and the plot number near the circle.
5. Determine and pinprick the ground location of the RP on the new photos using photo interpretation. Circle the pinprick in pencil on the back of the photo and write "RP to subplot (insert number)" near the circle (Example: "RP to subplot 3"). Also write RP Data on the back of the photo including: species, diameter, azimuth, horizontal distance, and the subplot number referenced.

Keep in mind that the field grid location in this case, is <u>not</u> at the location of the center pin. The field grid location is always the center of subplot 1 on the standard layout regardless of whether it is referenced.

3.5.2 THE REFERENCE POINT (RP)

The RP references the center pin. It is an object (usually a tree) that is prominent, apt to be present at next visit and easily located on the ground.

<u>Selecting an RP:</u> The RP should be distinctive on both the ground and on the new photos. You may reuse an old RP tree on a previously measured plot if it is suitable. If the old RP tree is dead, missing, or difficult to identify on the ground or on the plot photo, select a new RP. If possible, it should be a tree which is not likely to die or be cut before the next inventory. You may select a snag or other object for an RP (i.e., a distinctive fence post, building corner, telephone pole, etc.). If you use such a RP, describe it on the plot photo and in "Location Description" on the Plot Card.

Tag the RP: ***Special Note for Hawaii only: Do not affix the lower square tag on lands owned by the Division of Forestry and Wildlife (DOFAW). Upper tags should still be affixed to the RP 6 feet or higher. Two tags should be affixed facing the direction of approach and one tag facing the direction to plot. Also, the RP tags in Hawaii face away from near-by roads or trails.**

Mark the RP tree with new or reused tags. Nail aluminum square tags on two or more sides of the RP tree, 6 feet above ground line, facing directions you expect future crews to approach the RP. Also nail an aluminum square tag on the RP tree below stump height, on the side of the tree facing the center pin. When attaching a tag, drive the nail into the tree only enough to anchor the nail firmly into the wood; always leave at least 2 inches of nail exposed. **Pinprick the RP location:** Pinprick the ground location of the RP on the new photos UNLESS the RP pinprick would obscure another pinprick. Circle the RP pinprick on the back of the photo and write "RP" and the plot number near the circle (but do not obscure any pinpricks).

Record RP data: Record the species of the RP, it's d.b.h. to the nearest inch, azimuth from RP to center pin, and horizontal distance measured to the nearest foot from RP to the center pin on the back of the aerial photo, under "RP Data" on the Plot Card, and in the Data Recorder.

In "Plot Access Description" on the Plot Card, record any information that would aid the next crew in relocating the plot. Describe prominent features present in the plot area that are unlikely to change in the next ten years; examples include details such as slope, aspect, topographic position, recognizable physiographic features (i.e. streams, rock outcrops, benches), human-made features, and unusual or large trees. If any new roads have been built in the plot area since the date of the new field photos, sketch them on the photos if it will help the next crew to find the plot.

Example: "The RP is a large Ohia-fir (over 50 feet tall) in a draw that descends northeast from mainline logging road 1000. Subplot 1 is down slope from the RP and is just down slope and next to a large rock outcrop."

3.5.3 REFERENCING THE CENTER PIN

***Special Note for Hawaii Only: Do not affix the lower reference tags or nails to reference trees on lands owned by the Division of Forestry and Wildlife (DOFAW). This is a special case request. The upper tags should still be installed.**

To reference the center pin with nearby trees, **do the following steps:**

A. Select two trees near the center pin that form, as closely as possible, a right angle with the stake. If the previous reference trees meet this criterion, reuse them. On a revisited plot, if you select a new reference tree, remove the square tags (if present) from the reference tree it is replacing to avoid confusing the next crew. Trees within 6 feet of the stake are preferable. If live trees are not available, use stumps or sound snags.
B. Nail a square (silver) aluminum tag well below stump height (< 0.5 feet above ground level) on each witness tree on the side facing plot center.

C. At two locations on each witness tree, nail a square aluminum tag six feet above ground height facing the direction of expected approach to plot.
D. If the references for the center pin are stumps, shrubs, or other objects, follow the procedures listed below for witnessing other subplots with the following exception: use the square (silver) aluminum tags instead of the yellow round tags.
E. Record data about the witness trees in the Data Recorder; refer to "Recording witness tree data," section 3.7.

3.6 Referencing the other subplots on the standard layout

***Special Note for Hawaii Only: Do not affix the lower reference tags or nails to reference trees on lands owned by the Division of Forestry and Wildlife (DOFAW). This is a special case request. The upper tags should still be installed 6 feet or higher.**

One subplot on the standard layout, usually subplot 1, is referenced adequately by the center pin and its nearby witness trees and RP. Do the following steps:

1. Mark subplot center.

Mark subplot center with a metal pin and round, and tie a piece of flagging to the pin.

2. Select witness trees.

Select 2 trees near the pin that form, as closely as possible, a right angle with the pin. Trees within 6 feet of the pin are preferred. If trees are not available, use stumps or sound snags. On subplots established previously, reuse the previous witness trees, or if there are better trees available, use new witness trees. Renew old witness tags as needed.

3. Tag the reference trees.

Table 3.1: Hardware for subplot witness monumentation

Subplot	Hardware
Plot Center (PC, Subplot 1)	Silver aluminum square tags. If the witnesses are also numbered tally trees, attach the tree number tags with the same nails (i.e., numbered tag on top of square tag).
Subplots 2-4	Two-color round aluminum tags with yellow side out.

Table 3.2: Standards for monumentation of various witness types

Witness Type	Standards
Live tally tree greater than or equal to 3.0 inches DBH	Attach one tag below stump height facing subplot center, and attach tags six feet above ground height facing the direction of anticipated approach to the subplot. Note: avoid using tally saplings unless no other trees are available. If saplings must be used, wire the tag to an ancillary branch.
Dead tally tree	Attach one tag below stump height facing subplot center, and attach tags six feet above ground height facing the direction of anticipated approach to the subplot. Pound nails flush with the bole of the snag.
Non-tally tree	Attach one tag below stump height facing subplot center, and attach tags six feet above ground height facing the direction of anticipated approach to the subplot. If the witness is a live tree greater than or equal to 3.0 inches DBH, attach an aluminum nail at the diameter measurement point. If saplings must be used, wire the tag to an ancillary branch facing subplot center.

Stump (i.e., less than 4.5 feet tall)	Attach a yellow round tag below stump height facing plot center. Attach another tag centered on the top/cut face of the stump. When nailing tags to stumps, pound nails flush to the bole. Tags nailed to stumps stay attached longer if bark is removed prior to nailing the tag.
Shrub	Nail or wire a yellow round tag to the base of the shrub facing subplot center. If possible, nail or wire additional rounds higher in the shrub facing the direction of expected approach to the subplot.
Other objects	Monument as appropriate for the object.

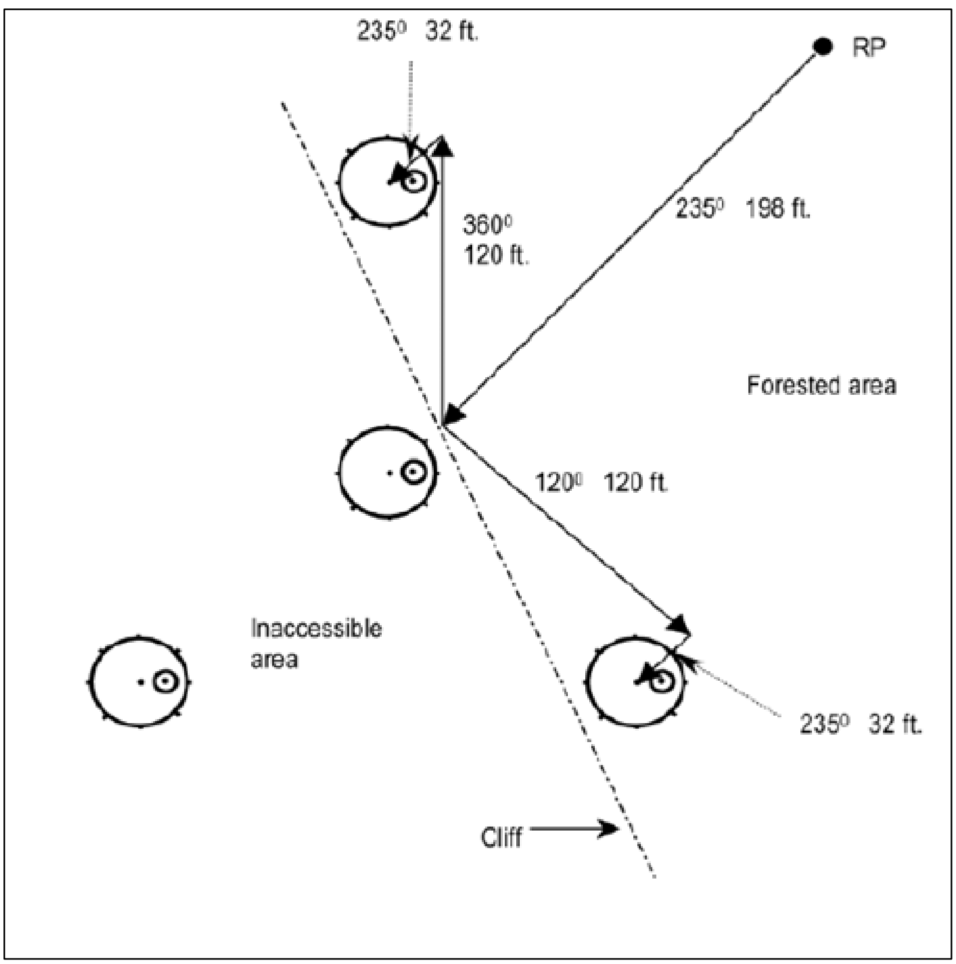
4. Record data about the witness trees
Refer to "Recording witness tree data" (next section).

3.7 Establishing Subplots When Plot Center is Inaccessible

When plot center is inaccessible (e.g., hazardous due to cliffs, falls in census water), but one or more of the other subplot centers is accessible, establish all accessible subplots by using the offset procedures described below.

In the following example, plot center (PC) is inaccessible, but subplots 2 and 3 are in accessible forest land. All of subplots 1 and 4 are classified as CONDITION CLASS STATUS = 5 (nonsampled). Subplot 2 and subplot 3 must be established since they are in accessible forest land (see Figure 3.2: Inaccessible plot center).

Example: The course from RP to PC is 235 degrees for 230 feet. The cliff is encountered at 198 feet—32 feet short of PC. To establish subplot 2, proceed 360 degrees for 120 feet, then proceed on the original azimuth (235 degrees) for the remaining 32 feet to the center of subplot 2. To establish subplot 3: start where the original course from RP to PC ended; go 120 degrees for 120 feet; then go 235 degrees for 32 feet to the center of subplot 3.



3.8 Recording witness tree data (all subplots on the standard layout)

***Special Note for Hawaii Only: Lands owned by the Division of Forestry and Wildlife (DOFAW) and national parks where lower tags cannot be attached: Record the slope distance from the base of the subplot (at center) to the front of the tree/object at the base in the data recorder.**

Azimuth (subplot center to tree), slope distance to the head of the nail affixing the basal tag or tree number tag, species, and diameter are recorded for each witness tree, snag, or stump. Other witness objects only require an azimuth, slope distance, and a record note to describe the object. NOTE: Witness tree distance is always slope distance from the subplot center to the head of the nail affixing the basal aluminum tag or tree number tag. This is in addition to the horizontal distance to the center of the tree collected for all tally trees. Record this information in the data recorder.

3.9 Plot layout and Referencing Tolerance

RP selection
Tolerance: No error in selection criteria

Subplot location
Tolerance: Remeasured subplot: +/- 0.5 ft. of previous location
New subplot: +/- 5.0 ft.
Subplot witness (tree) selection
Tolerance: No error in selection criteria

4 PLOT LEVEL DATA

Plot attributes record information about the plot location, the field crew visit, and landowner contact/ requests. This information aids future crews in plot relocation, sets up date and inventory cycle information in the data recorder, and makes it possible to analyze the relationship of plot data to other mapped data (e.g., rivers).

<u>All data items listed in this chapter are collected on plots with at least one accessible forest land condition (PLOT STATUS = 1) and all NONFOREST/NONSAMPLED plots (PLOT STATUS = 2 or PLOT STATUS = 3). In general, plot level data apply to the entire plot and they are recorded from the center of subplot 1. A plot is considered nonforest if no part of it is currently located in forest land (CONDITION CLASS STATUS = 1). A plot is nonsampled if the entire plot is not sampled for one of the reasons listed in PLOT NONSAMPLED REASON.</u>

<u>If a forest plot has been converted to nonforest or becomes a nonsampled plot, the previous data are reconciled and an attempt is made to visit the plot during the next inventory. If a nonforest plot becomes forest or access is gained to a previously nonsampled plot, a new forest ground plot is installed. All nonforest and nonsampled plots are visited if there is any reasonable chance that they might include some forest land condition class.</u>

<u>Trees on previously forest land plots will be reconciled during data processing. There is a distinction between plots that have been clearcut, and plots that have been converted to another land use. A clearcut plot is considered to be forest land until it is actively converted to another land use.</u>

4.1 Lost Plot/Replacement Plot

Plots that cannot be relocated by using the guidelines in Section 2.7.2, Established Plot Issues, are considered lost; certain procedures must be followed to “close out” the old (lost) plot and replace it with a new plot.

Remeasurement plots (SAMPLE KIND = 2) - (see Replacement Plot, Section 4.1.2) for specific procedures.

4.1.1 LOST ANNUAL PLOT

If a previously established annual inventory (four-subplot design) plot (SAMPLE KIND = 2) cannot be found, the plot is considered lost and the state coordinator must be notified.

1. Close out the lost annual plot:
    - If trees were recorded: Use coding procedures for lost plots listed under PLOT NONSAMPLED REASON (Section 4.3.9).
    - If trees were recorded and there is no evidence of disturbance: Document factors you believe contributed to the plot being lost on the plot card and in the electronic PLOT NOTES (Section 4.3.26).
    - If trees were recorded and there is evidence of disturbance: efforts to locate plot must be documented and the state coordinator notified. Document factors you believe contributed to the plot being lost on the plot card and in the electronic PLOT NOTES. An explicit description

of the percentage of mortality and cause of death of trees must be recorded; the plot will be reviewed by analysts at the end of the season.

2. Install a replacement plot (see Section 4.1.2, Replacement Plot).

4.1.2 REPLACEMENT PLOT

Once a lost annual plot is closed out (see Section 4.1.1, Lost Annual Plot), a replacement plot must be installed at the ground location marked by the original PI photo pinprick or the digitized coordinates of that pinprick if there are no photos. Create a new plot file for the replacement plot (SAMPLE KIND = 3); a new (or surrogate) PLOT NUMBER will be assigned (see Section 4.2.4). Locating and laying out a replacement plot should be performed as if installing the plot for the first time. Notify the data manager before sending any replacement plots to the office.

4.2 Plot Level Attributes

4.2.1 STATE (CORE 1.1) or COUNTRY
[PLOT.STATECD]

Downloaded unique FIPS (Federal Information Processing Standard) code identifying the State where the plot center is located.

When collected: All plots
Field width: 2 digits
Tolerance: No errors
Values:

15 HAWAII
60 AMERICAN SAMOA
64 FEDERATED STATES OF MICRONESIA
66 GUAM
68 MARSHALL ISLANDS
69 COMMONWEALTH OF THE NORTHERN MARIANAS
70 PALAU

4.2.2 ISLAND (PACIFIC ISLANDS)
[PLOT.PAC_ISLAND_PNWRS]

Downloaded name identifying the island the plot is located on. This should also be printed on the Plot Jacket.
When collected: All plots
Field width: 20 characters
Tolerance: No errors
Values: (See Appendix 2 and Appendix 3 for Island Names)

4.2.3 COUNTY (CORE 1.2)
[PLOT.COUNTYCD]

Downloaded unique FIPS (Federal Information Processing Standard) code identifying the county, parish or borough where the plot center is located.

When collected: All plots
Field width: 3 digits
Tolerance: No errors
Values: See Appendix 2

4.2.4 PLOT NUMBER (CORE1.3)

[PLOT.PLOT]

Record the identification number for each plot, unique within a county, provincial unit or island.

When collected: All Plots
Field width: 5 digits
Tolerance: No errors
Values: 00001 to 99999

4.2.5 FIELD GUIDE VERSION (CORE 1.12)

[PLOT.MANUAL]

Record the version number of the National Core Field Guide that was used to collect the data on this plot. FIELD GUIDE VERSION will be used to match collected data to the proper version of the field guide.

When collected: All plots
Field width: 2 digits (x.y)
Tolerance: No errors
Values: 5.1

4.2.6 VEGETATION/INVASIVE SAMPLING

4.2.6.1 P2 VEGETATION SAMPLING STATUS (CORE OPTIONAL 8.3.1)

[PLOT.P2VEG_SAMPLING_STATUS_CD]

This plot-level variable determines whether vegetation data will be recorded on the plot and the land class(es) on which it will be recorded. If P2 VEGETATION SAMPLING STATUS = 0, no further P2 Vegetation data collection is required. Default value for Pacific Islands is 2 for all plots with the exception of non-experimental forest lands in Hawaii.

When collected: All plots
Field width: 1 digit
Tolerances: At least 99% of the time
Values:

0	Not sampling vegetation
1	Vegetation data collected only on accessible forest land conditions (CONDITION CLASS STATUS = 1 and NONFOREST SAMPLING STATUS = 0)
2	Vegetation data collected on all accessible land conditions (CONDITION CLASS STATUS=1 or 2, NONFOREST SAMPLING STATUS =1 and NONFOREST PLOT STATUS=1)

4.2.6.2 LEVEL OF DETAIL (CORE OPTIONAL 8.3.2)

[PLOT.P2VEG_SAMPLING_LEVEL_DETAIL_CD]

This plot-level variable determines whether data are collected for vegetation structure growth habits only or for individual species (that qualify as most abundant) as well. If LEVEL OF DETAIL = 3, then a tree species could be recorded twice, but it would have two different species growth habits (see 8.5.1 SPECIES GROWTH HABIT). **The Pacific Islands inventory will be downloaded with code "2".**

When collected: on all plots where P2 vegetation is being sampled (P2 VEGETATION SAMPLING STATUS = 1 or 2)
Field width: 1 digit
Tolerances: At least 99% of the time

Values:

1	Collect data for vegetation structure only; total aerial cover and cover by layer for tally tree species (all sizes), non-tally tree species (all sizes), shrubs, forbs, and graminoids.
2	Collect vegetation structure data (Level of Detail = 1) **plus** understory species composition data including up to four species of: seedlings and saplings of any tree species (tally or non-tally) <5 inches DBH ,shrubs (including woody vines), forbs, and grasses.
3	Collect vegetation structure data, understory species composition data (Level of Detail = 2), **plus** up to four trees species (tally or non-tally) ≥5 inches DBH

4.2.6.3 INVASIVE PLANT SAMPLING STATUS (CORE OPTIONAL 9.3) [PLOT.INVASIVE_SAMPLING_STATUS_CD]

Determines whether invasive plant data will be recorded on the plot and the land class(es) on which it will be recorded. **For most of the Pacific Islands, (with the exception of non-Experimental Forest Land in Hawaii), this data item will be downloaded with code "2".**

When collected: All plots
Field width: 1 digit
Tolerance: No errors
Values:

0	Not collecting invasive plant data
1	Invasive plant data collected only on accessible forest land conditions (CONDITION CLASS STATUS = 1)
2	Invasive plant data collected on all accessible land conditions (CONDITION CLASS STATUS =1 OR NONFOREST CONDITION STATUS=2)

4.2.6.4 INVASIVE PLANT SPECIMEN COLLECTION RULE (CORE OPTIONAL 9.12) [PLOT.INVASIVE_SPECIMEN_RULE_CD]

Downloaded code to indicate if collection of specimens of unknown (or suspected) invasive species is required. **The Pacific Islands inventory will be downloaded with code "0" for this data item.**

When collected: Downloaded on all plots where INVASIVE PLANT SAMPLING STATUS = 1 or 2
Field width: 1 digit
Tolerance: No errors
Values:

0	FIA unit does not require specimen collection for invasive plants
1	FIA unit requires specimen collection for invasive plants

4.2.7 SURVEY GRADE GPS COORDINATES COLLECTED (AFSL/PACIFIC ISLANDS) [PLOT.GPS_SAMPLING_STATUS_CD_PNWRS]

Downloaded code identifying whether or not Survey Grade GPS Coordinate information should be collected on plot. Survey grade GPS coordinates will be collected on all plots in the Pacific Islands starting in 2014.

When collected: All plots
Field Width: 1 digit
Tolerance: No errors
Values:

0	No, Survey Grade GPS Coordinates **will not be collected** on plot
1	Yes, Survey Grade GPS Coordinates will be collected on plot

4.2.8 DECLINATION (CORE OPTIONAL 1.14)

[PLOT.DECLINATION]

Downloaded azimuth correction used to adjust magnetic north to true north. All azimuths are assumed to be magnetic azimuths unless otherwise designated. The PNW FIA units have historically corrected all compass readings for true north. This field is to be used only in cases where units are adjusting azimuths to correspond to true north; for units using magnetic azimuths, this field will always be set = 0 in the office. This field carries a decimal place because the USGS corrections are provided to the nearest half degree. DECLINATION is defined as: **DECLINATION = (TRUE NORTH - MAGNETIC NORTH).**

Note: For Pacific Island plots, azimuths are always in relation to true North. The declination adjustment used for each plot will be downloaded/printed, and is listed by Island in Appendix 3. This adjustment is made in the field by setting the declination for the plot to "East declination" on the compass. Do not change the downloaded/printed code.

When collected: Downloaded for all plots
Field width: 4 digits including sign. (+xxx.y)
Tolerance: No errors
Values: Downloaded values

4.3 Plot Level Data Collected in the Field

4.3.1 QA STATUS (CORE 1.17)

[PLOT.QA STATUS]

Record the code to indicate the type of plot data collected, using the following codes: (See Appendix 15 for definitions of QA Status)

When collected: All plots
Field width: 1 digit
Tolerance: No errors
Values:

1	Standard production plot
2	Cold check
3	Reference plot (off grid)
4	Training/practice plot (off grid)
5	Botched plot file (disregard during data processing)
6	Blind check
7	Hot check (production plot)

4.3.2 CREW NUMBER (CORE 1.18)

[PLOT.CREWNBR1, CREWNBR2, CREWNBR3, CREWNBR4, CREWNBR5]

Record up to 5 crew numbers as assigned to the field crew; always record the crew leader first. The first 2 digits are for the responsible unit's station number (NRS – 24xxxx, SRS – 33xxxx, RMRS – 22xxxx, and PNW – 26xxxx).

When collected: All plots
Field Width: 6 digits
Tolerance: No errors
Values: PNW 260000 – 269999

4.3.3 YEAR (CORE 1.13.1)
[PLOT.MEASYEAR]

Record the year that the plot was completed.

When collected: All plots
Field width: 4 digits
Tolerance: No errors
Values: $\geq$ 2012

4.3.4 MONTH (CORE 1.13.2)
[PLOT.MEASMON]

Record the month that the plot was completed.

When collected: All plots
Field width: 2 digits
Tolerance: No errors
Values:

January	01	May	05	September	09
February	02	June	06	October	10
March	03	July	07	November	11
April	04	August	08	December	12

4.3.5 DAY (CORE 1.13.3)
[PLOT.MEASDAY]

Record the day of the month that the plot was completed.

When collected: All plots
Field width: 2 digits
Tolerance: No errors
Values: 01 to 31

4.3.6 PLOT STATUS (CORE 1.4)
[PLOT.PLOT_STATUS_CD]

Record the code that describes the sampling status of the plot. In cases where a plot is inaccessible, but obviously contains no forest land, record PLOT STATUS = 2. In cases where a plot is access-denied or hazardous land use and has the possibility of forest, record PLOT STATUS = 3.

When collected: All plots
Field width: 1 digit
Tolerance: No errors
Values:

1	Sampled – at least one accessible forest land condition present on plot
2	Sampled – no accessible forest land condition present on plot
3	Nonsampled – possibility of forest land

4.3.7 NONFOREST SAMPLING STATUS (CORE 1.5)
[PLOT.NF_SAMPLING_STATUS_CD]

Record whether this plot is part of a nonforest inventory. If NONFOREST SAMPLING STATUS = 1, then the entire suite of attributes that are measured on the forest lands will be measured and only those suites of attributes that are measured on forest lands can be measured on nonforest lands. This variable will be prepopulated as “1” for all plots in the 2013 Guam inventory.

When collected: All plots
Field width: 1 digit
Tolerance: no errors
Values:

0 Nonforest plots / conditions are not inventoried
1 Nonforest plots / conditions are inventoried

4.3.8 NONFOREST PLOT STATUS (CORE 1.6)

[PLOT.NF_PLOT_STATUS_CD]

Record the code that describes the sampling status of the other-than-forest plot, i.e., PLOT STATUS = 2. In cases where the plot is inaccessible, but obviously contains no nonforest land, i.e., plot is either noncensus water or census water, record NONFOREST PLOT STATUS = 2.

When collected: When PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1
Field width: 1 digit
Tolerance: no errors
Values:

1 Sampled – at least one accessible nonforest land condition present on the plot
2 Sampled – no nonforest land condition present on plot, i.e., plot is either census and/or noncensus water
3 Nonsampled nonforest

4.3.9 PLOT NONSAMPLED REASON (CORE 1.7)

[PLOT.PLOT_NONSAMPLE_REASON_CD]

For entire plots that cannot be sampled, record one of the following reasons.

When collected: When PLOT STATUS = 3
Field width: 2 digits
Tolerance: No errors
Values:

01 Outside U.S. boundary – Entire plot is outside of the U.S. border.
02 Denied access – Access to the entire plot is denied by the legal owner, or by the owner of the only reasonable route to the plot. Because a denied-access plot can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available.
03 Hazardous – Entire plot cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, high water, etc. Although most hazards will not change over time, a hazardous plot remains in the sample and is re-examined at the next occasion to determine if the hazard is still present.
05 Lost data – Plot data file was discovered to be corrupt after a panel was completed and submitted for processing. This code is applied at the time of processing after notification to the units. This code is for office use only.
06 Lost plot – Entire plot cannot be found. Whenever this code is assigned, a replacement plot is required. The plot that is lost is assigned SAMPLE KIND = 2 and NONSAMPLED REASON = 6. The replacement plot is assigned SAMPLE KIND = 3.
07 Wrong location – Previous plot can be found, but its placement is beyond the tolerance limits for plot location. Whenever this code is assigned, a replacement plot is required. The plot being relocated is assigned SAMPLE KIND = 2 and NONSAMPLED REASON = 7. Its replacement plot is assigned SAMPLE KIND = 3.
08 Skipped visit – Entire plot skipped. Used for plots that are not completed prior to the time a panel is finished and submitted for processing. This code is for office use only.
09 Dropped intensified plot - Intensified plot dropped due to a change in grid density. This code used only by units engaged in intensification. This code is for office use only.
10 Other – Entire plot not sampled due to a reason other than one of the specific reasons already

listed. A field note is required to describe the situation.

4.3.10 NONFOREST PLOT NONSAMPLED REASON (CORE 1.8)

[PLOT.NF_PLOT_NONSAMPLE_REASON_CD]

For entire plots that cannot be sampled, record one of the following reasons.

When collected: When PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST PLOT STATUS = 3
Field width: 2 digits
Tolerance: No errors
Values:

02 Denied access – Access to the entire plot is denied by the legal owner, or by the owner of the only reasonable route to the plot. Because a denied-access plot can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available.
03 Hazardous – Entire plot cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, high water, etc. Although most hazards will not change over time, a hazardous plot remains in the sample and is re-examined at the next occasion to determine if the hazard is still present.
08 Skipped visit – Entire plot skipped. Used for plots that are not completed prior to the time a panel is finished and submitted for processing. This code is for office use only.
10 Other – Entire plot not sampled due to a reason other than one of the specific reasons already listed. A field note is required to describe the situation.

4.3.11 SUBPLOTS EXAMINED (CORE 1.9)

[PLOT.SUBP_EXAMINE_CD]

Record the number of subplots examined. By default, PLOT STATUS = 1 plots have all 4 subplots examined.
When collected: All plots
Field width: 1 digit
Tolerance: No errors
Values:

1 Only subplot 1 center condition examined and all other subplots assumed (inferred) to be the same (remote sensing use only)
4 All four subplots fully described (no assumptions/inferences) (for field visited plots and plots viewed from a distance)

4.3.12 SAMPLE KIND (CORE 1.10)

[PLOT.KINDCD]

Record the code that describes the kind of plot being installed.
When collected: All plots
Field width: 1 digit
Tolerance: No errors
Values:

1 Initial 4-subplot plot establishment - the initial establishment and sampling of a national design plot (FIA Field Guide versions 1.1 and higher). SAMPLE KIND 1 is assigned under the following circumstances:
Initial activation of a panel or subpanel
Reactivation of a panel or subpanel that was previously dropped
Resampling of established plots that were not sampled at the previous visit
2 Remeasurement – remeasurement of a national design plot that was sampled at the previous

inventory.

3 Replacement plot - a replacement plot for a previously established plot. Assign SAMPLE KIND = 3 if a plot is re-installed at a location other than the original location (i.e., plots that have been lost, moved, or otherwise replaced). Note that replacement plots require a separate plot file for the replaced plot. Replaced (lost) plots are assigned SAMPLE KIND = 2, PLOT STATUS = 3, and the appropriate NONSAMPLED REASON code. Lost plots retain the original plot number. For the replacement *(new)* plot, open a new file in the PDR with a plot number generated by MIDAS (or 99999 until the replacement plot number can be generated); assign PLOT STATUS = 1 or 2, SAMPLE KIND = 3, and tie it to the replaced plot by entering the PREVIOUS PLOT NUMBER.

Sample Kind Assignment Matrix

Time X	**Time X+1**	
PLOT STATUS	**1 or 2**	**1, 2 or 3**
SAMPLE KIND	1	2
PLOT STATUS	3	1, 2 or 3
SAMPLE KIND	1	1
PLOT STATUS	3	1, 2 or 3
SAMPLE KIND	2	1

*Time X and Time X+1 refer to any two sequential, scheduled (on-panel) inventories.

Initial Plot Establishment: For the purpose of assigning SAMPLE KIND, initial plot establishment is defined as the first scheduled on-panel sample, not the more literal interpretation of the first time a plot is installed on the ground. For example, a privately owned plot determined to be nonforest during the pre-field review at the first scheduled on-panel sample is coded SAMPLE KIND = 1. At the next on-panel sample, the plot is installed on the ground for the first time and is coded SAMPLE KIND = 2.

What data is re-measured: For normally scheduled (on-panel) plots, data from the previous on-panel sample will be re-measured and reconciled, regardless of interim field visits due to special studies or temporal intensification. For off-panel field visited plots, the last field visit will be re-measured and reconciled, regardless if it was on or off-panel.

4.3.13 SAMPLE METHOD CODE (PNW) [PLOT.DATA_SOURCE_PNWRS]

Record the code that describes the source for the data collected on the plot location.

When collected: All plots
Field width: 1 digit
Tolerance: No errors
Values:

1 Ground - All data collected from a ground visit by a field crew.
2 Viewed from a distance - Location was flown over or viewed from a distance (e.g., viewed from a road or adjacent ridgeline).
3 Photo Interpretation - Information for the location was determined using photo interpretation.
4 Other - Specify source of data in PLOT NOTES and on the plot card.

4.3.14 CHANGE MATRIX REQUIRED (PFSL/PACIFIC ISLANDS) [PLOT.CHANGE_MATRIX_REQUIRED_PNWRS]

A downloaded code indicating if remeasurement protocol (Section 5.6) should be followed. This code cannot be changed in the field.

When collected: All plots
Field width: 1 digit
Tolerance: No errors
Values:

N Change matrix not required
Y Change matrix required

4.3.15 PREVIOUS PLOT MAPPING OR CONDITION ERROR (PFSL/PACIFIC ISLANDS) [PLOT.PREV_COND_MAP_ERROR_PNWRS]

Record a code to indicate whether or not a previous mapping error exists on the plot (any of the four subplots), or if there are errors in any of the previous condition class data items. PREVIOUS PLOT MAPPING OR CONDITION ERROR = Y if any previous errors exist in Condition delineating data items.

When collected: SAMPLE KIND = 2
Field width: 1 digit
Tolerance: No errors
Values:

N No error in previous plot mapping or condition class data items
Y Error in previous plot mapping or condition class data items

4.3.16 PREVIOUS PLOT NUMBER (CORE1.11) [PLOT.REPLACED_PLOT_NBR]

Record the identification number for the plot that is being replaced.

When collected: When SAMPLE KIND = 3
Field width: 5 digits
Tolerance: No errors
Values: 00001 to 99999

4.3.17 TRAILS OR ROADS (PACIFIC ISLANDS) [PLOT.RDCD]

Record the nearest trail or road to the plot. Use the plot photo, maps, or reasonable observations made while traveling to the plot to determine nearest trail or road (within 1 mile straight-line distance of the plot center). If two or more trails or roads are estimated to be equally distant, code the higher quality trail or road (lower code number). Base the coding decision on the condition of the road at the time of the visit.

When collected: All plots with either one accessible forest land condition class (PLOT STATUS = 1) or one accessible nonforest land condition class when nonforest is being sampled (PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST PLOT STATUS =1
Field width: 1 digit
Tolerance: No errors
Values:

0 None within 1 mile
1 Paved road or highway
2 Improved gravel road (has gravel, ditching, and/or other improvements)
3 Improved dirt road (has ditching, culverts, signs, reflectors, or other improvements)
4 Unimproved dirt road/four-wheel drive road/atv trail (has no signs of any recent improvements)
5 Human access trail- clearly noticeable and primarily for recreational use

4.3.18 HORIZONTAL DISTANCE TO IMPROVED ROAD (CORE 1.15) [PLOT.RDDISTCD]

Record the straight-line distance from plot center (subplot 1) to the nearest improved road. An improved road (TRAILS OR ROADS = 1, 2, or 3) is a road of any width that is maintained as evidenced by pavement, gravel, grading, ditching, and/or other improvements.

When collected: All plots with at least one accessible forest land condition class (PLOT STATUS = 1) or one accessible nonforest land condition class when nonforest is being sampled (PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST PLOT STATUS =1

Field width: 1 digit
Tolerance: No errors
Values:

1	100 feet or less
2	101 to 300 feet
3	301 to 500 feet
4	501 to 1000 feet
5	1001 feet to 1/2 mile
6	1/2 to 1 mile
7	1 to 3 miles
8	3 to 5 miles
9	Greater than 5 miles

4.3.19 ROAD ACCESS (PACIFIC ISLANDS) [PLOT.RDUSECD]

Record the first road access restrictions encountered while traveling to the plot. These restrictions limit car and truck access to the starting point for the walk to the plot, and may occur on ownerships encountered before reaching the plot area.

When collected: All plots with either one accessible forest land condition class (PLOT STATUS = 1) or one accessible nonforest land condition class when nonforest is being sampled (PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST PLOT STATUS =1

Field width: 1 digit
Tolerance: No errors
Values:

0	None – no road access restrictions
1	Road blocked by locked gate or cable across road
2	Road blocked by a human-made obstruction across road (ditch, mound, etc.)
3	Road blocked by natural occurrences (trees blown over onto road, road or bridge washed out)
4	Posted no motorized vehicle signs; road present, but restricted area such as Wilderness or National Park where vehicles are not allowed
9	Other – specify in PLOT NOTES

4.3.20 PUBLIC USE RESTRICTIONS (PACIFIC ISLANDS) [PLOT.PUBUSECD]

Record, if any, the restriction posted near or on the plot area that limits public use of the plot area; if more than one restriction occurs for the plot area, record the lowest number restriction present (1-3, 9).

When collected: All plots with either one accessible forest land condition class (PLOT STATUS = 1) or one accessible nonforest land condition class when nonforest is being sampled (PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST PLOT STATUS =1

Field width: 1 digit
Tolerance: No errors
Values:
0 None – no public use restrictions
1 Keep out / no trespassing
2 No hunting or fishing
3 No dumping
9 Other - specify in PLOT NOTES

4.3.21 RECREATION USE 1 (PACIFIC ISLANDS) [PLOT.REUSECD1]

Record up to 3 signs of recreation use encountered within the accessible forest land portion (and accessible nonforest land portion(s) when nonforest is being sampled) of any of the four subplots, based on evidence such as campfire rings, compacted areas (from tents), hiking trails, bullet or shotgun casings (if you are not on a military firing range), tree stands, etc. Record the recreation use that has had the most significant impact on the plot area first, then the second and third use. For example, in general numerous four-wheel drive or ATV trails would be coded before camping, and camping before hiking, and hiking before fishing. Use the coding system provided as a hierarchy. Do not repeat codes, except codes 0 and 9. Physical recreation evidence must be present to code 1-9. Also, disregard dumping where no evidence of recreation is present. Examine the plot area for clues before spending an exorbitant amount of time trying to find evidence that normally would not be found in the area; look for the obvious signs first.

When collected: All plots with either one accessible forest land condition class (PLOT STATUS = 1) or one accessible nonforest land condition class when nonforest is being sampled (PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST PLOT STATUS =1

Field width: 1 digit
Tolerance: No errors
Values:
0 No evidence of recreation use
1 Motor vehicle (four wheel drive, ATV, motorcycle)
2 Horse riding
3 Camping
4 Hiking
5 Hunting/shooting
6 Fishing
7 Boating – physical evidence such as launch sites or docks
9 Other – recreation use where evidence is present, such as human litter, but purpose is not clear or does not fit into above categories.

4.3.22 RECREATION USE 2 (PACIFIC ISLANDS) [PLOT.REUSECD2]

Record the second most significant recreation use impact. See RECREATION USE 1 for coding instructions.

4.3.23 RECREATION USE 3 (PACIFIC ISLANDS) [PLOT.REUSECD3]

Record the third most significant recreation use impact. See RECREATION USE 1 for coding instructions.

4.3.24 WATER ON PLOT (CORE 1.16)
[PLOT.WATERCD]

Record the water source that has the greatest impact on the area within the accessible forest land portion of any of the four subplots. The coding hierarchy is listed in order from large permanent water to temporary water. This variable may be used for recreation, wildlife, hydrology, and timber availability studies.

When collected: All plots with at least one accessible forest land condition class (PLOT STATUS = 1) or one accessible nonforest land condition class when nonforest is being sampled (PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST PLOT STATUS =1

Field width: 1 digit
Tolerance: No errors
Values:
0 None – no water sources within the accessible forest land CONDITON CLASS
1 Permanent streams or ponds too small to qualify as noncensus water
2 Permanent water in the form of deep swamps, bogs, marshes without standing trees present and less than 1.0 ac in size, or with standing trees
3 Ditch/canal – human-made channels used as a means of moving water, such as irrigation or drainage which are too small to qualify as noncensus water
4 Temporary streams
5 Flood zones – evidence of flooding when bodies of water exceed their natural banks
6 Tidal water
9 Other temporary water – specify in PLOT NOTES

4.3.25 LANDOWNER PLOT SUMMARY REQUEST (PNW)
[PLOT.LAND_OWN_REQ_CD_PNWRS]

Record a 1-digit code which indicates if a landowner of the plot area requests a summary of the data collected on their land. Make any special comments relevant to the data request (e.g., landowner does not own all four subplots, the owner of subplot 2 would like data, etc.) in the electronic PLOT NOTES and use code 2.

When collected: All plots
Field width: 1 digit
Tolerance: No Errors
Values:
0 No data requested
1 Plot summary requested
2 Special case request – Requires PLOT NOTES

4.3.26 PLOT NOTES (CORE 1.21)
[PLOT.NOTES]

Use these fields to record notes pertaining to the entire plot. If the notes apply only to a specific subplot or other specific aspect of the plot, then make that clear in the notes.

When collected: All plots
Field width: 2000 characters
Tolerance: N/A
Values: English language words, phrases and numbers

4.4 Reference Point (RP) Attributes

Record the following items which describe the reference point (RP) and the course from the RP to the plot as described in section 3.5.2, "The reference point (RP)". These data items should match what is recorded on the plot card and on the back of the photo.

4.4.1 RP TYPE (PNW)

[PLOT.RP_TYPE_PNWRS]

Record the type of object chosen as the reference point (RP).

When collected: All field visited plots
Field width: 1 digit
Tolerance: No errors
Values:

1 Tree or stump
2 Rock
3 Shrub
4 Other – specify in RP notes

4.4.2 RP SPECIES (PNW)

[PLOT.RP_SPCD_PNWRS]

If the RP is a tree or stump record the species code.

When collected: When RP TYPE = 1
Field width: 4 digits
Tolerance: No errors
Values: See Appendix 1,Tree Species List

4.4.3 RP DIAMETER (PNW)

[PLOT.RP_DIA_PNWRS]

If the RP is a tree or a stump, measure and record the DBH to the **nearest inch**.

When collected: When RP TYPE = 1
Field width: 3 digits
Tolerance: +/- 10 percent
Values: 001 to 999 to the nearest inch

4.4.4 RP AZIMUTH (PNW)

[PLOT.RP_AZIMUTH_PNWRS]

Record, in degrees, the azimuth from the RP to the plot center. When azimuth is determined using a GPS, include this information in the electronic RP NOTES and on the back of the photo.

When collected: All field visited plots
Field width: 3 digits
Tolerance: +/- 4 degrees
Values: 001 to 360

4.4.5 RP HORIZONTAL DISTANCE (PNW)

[PLOT.RP_DIST_PNWRS]

Record, to the nearest foot, the **horizontal** distance from the RP to the plot center; an RP should be within 5000 feet of plot center. When horizontal distance is collected using a GPS, include this information in the electronic RP NOTES and on the back of the photo.

When collected: All field visited plots
Field width: 4 digits
Tolerance: +/- 5 percent
Values: 0000 to 5000 feet

4.4.6 RP AZIMUTH/DISTANCE TO SUBPLOT NUMBER (PNW)
[PLOT.RP_SUBP_PNWRS]

Record the 1-digit number of the subplot which is referenced from the RP. Always reference to subplot 1 unless it is inaccessible (e.g., hazardous, denied access, census/non-census water). If subplot 1 center is inaccessible, the PC stake should be installed at the lowest numbered subplot that is accessible.

When collected: All field visited plots
Field width: 1 digit
Tolerance; No errors
Values: 1 to 4

4.4.7 RP NOTES (PNW)
[PLOT.RP_NOTES_PNWRS]

Record notes to explain any special RP situation that may need clarification for future plot visits. (e.g., shrub species, height/size of rock, RP not visited, RP AZIMUTH and RP HORIZONTAL DISTANCE collected with a GPS, etc.) Required if RP TYPE = 4 - other.

When collected: All field visited plots as needed to describe a special situation with the plot RP
Field width: 2000 characters
Tolerance: N/A
Value: Single words or abbreviated sentences

4.5 GPS Coordinates

Use a global positioning system (GPS) unit to determine the plot coordinates and elevation of all field-visited plot locations even if GPS has been used to locate the plot in the past.

4.5.1 GPS UNIT SETTINGS, DATUM, AND COORDINATE SYSTEM

Consult the GPS unit operating manual or other regional instructions to ensure that the GPS unit internal settings, including Datum and Coordinate system, are correctly configured. The Hawaiian and the Pacific Islands will use the WGS 84 Datum to collect coordinates. (See Appendix 4).

Each FIA unit will determine which coordinate system to use. Regions using a Geographic system will collect coordinates in Degrees, Minutes, and Seconds of Latitude and Longitude; the regions using the UTM coordinate system will collect UTM Easting, Northing, and Zone.

4.5.2 COLLECTING READINGS

Collect at least 180 GPS readings or let the GPS unit average for at least 3 minutes at the plot center. These may be collected in a file for post-processing or may be averaged by the GPS unit. Each individual position should have an error of less than 70 feet if possible (the error of all the averaged readings is far less).

Soon after arriving at plot center, use the GPS unit to attempt to collect coordinates. If suitable positions (180 readings at error less than or equal to 70 feet) cannot be obtained, try again before leaving the plot center.

If it is still not possible to get suitable coordinates from plot center, attempt to obtain them from a location within 200 feet of plot center. Obtain the azimuth and horizontal distance from the "offset" location to plot center. Record the azimuth and horizontal distance .

Coordinates may be collected farther than 200 feet away from the plot center if a laser measuring device is used to determine the horizontal distance from the "offset" location to plot center. Again, record the azimuth and horizontal distance.

In all cases try to obtain at least 180 readings or let the unit average at least 3 minutes before recording the coordinates.

4.5.3 SURVEY GRADE GPS COORDINATES

The objective of collecting Survey Grade GPS Coordinates is to obtain more accurate GPS coordinates for each field subplot location. Coordinates are used to precisely register plot information with remotely sensed imagery and data, and in relocating the plot at future inventories. Coordinates are collected using survey-grade GPS receivers.

Plots requiring Survey Grade GPS Coordinates will be preselected and triggered by the data item SURVEY GRADE GPS COORDINATES COLLECTED: 0 (No) or 1 (Yes). These coordinates will be collected on Experimental Forest plots on the Hawaiian Islands and other plots as decided by the Hawaiian Coordinator. **Note: This is not a substitute for Handheld GPS Coordinates. Handheld GPS coordinates will still need to be collected.**

If crew is unable to collect survey grade GPS coordinates at a given subplot, enter GPS Unit Type = 0 for the appropriate subplot and include a note explaining why the data could not be collected.

Operation instructions for using the Survey Grade GPS units can be found in Appendix 5.

When to collect Survey Grade GPS Coordinates:

1) When SURVEY GRADE GPS COORDINATES COLLECTED = 1 **AND** PLOT STATUS = 1 (sampled: at least one accessible forest land present on plot), coordinates should be taken at all subplots where the subplot center lands in accessible forest land or nonforest land (CONDITION CLASS STATUS 1 or 2).

2) When SURVEY GRADE GPS COORDINATES COLLECTED = 1 **AND** PLOT STATUS = 2 (sampled: no accessible forest land condition present on plot), coordinates should be taken on all subplots where the subplot center lands in a measurable nonforest condition class when nonforest is being measured (CONDITION CLASS STATUS = 2, NONFOREST SAMPLING STATUS = 1, NONFOREST CONDITION CLASS STATUS = 2.

The following data Items will be collected and entered into the data recorder:

4.5.4 GPS UNIT TYPE (CORE 1.19.3)
[PLOT.GPS_TYPE]
[GPS_PNWRS.GPS_TYPE]

Record the kind of GPS unit used to collect coordinates. If suitable coordinates cannot be obtained, record 0, including when survey grade GPS data cannot be collected. Record "3" for Survey Grade GPS units. Record "2" for most standard handheld GPS units.

When collected: All field visited plots
Field width: 1 digit
Tolerance: No errors
Values:

0	GPS coordinates not collected (requires GPS NOTES)
1	Rockwell Precision Lightweight GPS Receiver (PLGR)
2	**Other brand capable of field averaging**
3	Other brands capable of producing files that can be post-processed (Survey Grade GPS)
4	Other brands not capable of field-averaging or post-processing

4.5.5 GPS SERIAL/UNIT NUMBER (CORE 1.19.4)
[PLOT.GPS_SERIAL_NBR]
[GPS_PNWRS.SERIAL_NBR]

Record the last six digits of the serial number on the GPS unit used. For survey grade GPS units there may be less than six digits for the unit number. In this case record the entire unit number.

When collected: When GPS UNIT > 0
Field width: 6 digits
Tolerance: No errors
Values: 000001 to 999999

4.5.6 GPS DATUM (CORE 1.19.6)
[PLOT.GPS_DATUM]
[GPS_PNWRS.GPS_DATUM]

This is an auto-generated code indicating the map datum that the GPS coordinates are collected in (i.e. the map datum selected on the GPS unit to display the coordinates).

When collected: When GPS UNIT = 1, 2, or 4
Field width: 5 characters (cccnn)
Tolerance: No errors
Values: WGS84

4.5.7 COORDINATE SYSTEM (CORE 1.19.7)
[PLOT.GPS_COORD_SYS]
[GPS_PNWRS.COORD_SYS]

This is an auto-generated code indicating the type of coordinate system used to obtain readings.

When collected: When GPS UNIT = 1, 2, or 4
Field width: 1 digit
Tolerance: No errors
Values: 2 (UTM coordinate system)

4.5.8 GPS LOCATION TYPE (PNW)
[GPS_PNWRS.GPS_LOC_TYPE]

Record the location type for coordinates collected on the ground. Record codes 1-7 for handheld units. Record codes 15-18 for survey grade GPS coordinates.

When collected: All GPS records
Field width: 2 digits
Tolerance: No errors
Values:

1	LZ/TR Landing zone / Truck parking spot
2	RP Reference point
3	PC Plot center (PC) (required)
4	Subplot 2 Use only if PC not possible
5	Subplot 3 Use only if PC not possible
6	Subplot 4 Use only if PC not possible
7	Other Describe in GPS NOTES

The following values are required when SURVEY GRADE GPS COORDINTATES COLLECTED = 1

15	Survey grade GPS coordinates for subplot 1
16	Survey grade GPS coordinates for subplot 2
17	Survey grade GPS coordinates for subplot 3
18	Survey grade GPS coordinates for subplot 4

4.5.9 UTM ZONE (CORE 1.19.10)
[PLOT.UTM_ZONE]
[GPS_PNWRS.UTM_ZONE]

Record THE UTM ZONE **as determined by GPS**. See Appendix 4 HANDHELD GPS COORDINATES to confirm settings and proper UTM Zone.

When collected: When COORDINATE SYSTEM = 2
Field width: 3 digits
Tolerance: No errors
Values: See Appendix 4 for list of valid values.

4.5.10 EASTING (X) UTM (CORE 1.19.11)
[PLOT.UTM_EASTING_X]
[GPS_PNWRS.UTM_EASTING_X]

Record the Easting coordinate as determined by GPS.

When collected: When COORDINATE SYSTEM = 2
Field width: 7 digits
Tolerance: +/- 140 feet
Values: 0000000-9999999

4.5.11 NORTHING (Y) UTM (CORE 1.19.12)
[PLOT.UTM_NORTHING_Y]
[GPS_PNWRS.UTM_NORTHING_Y]

Record the Northing coordinate as determined by GPS.

When collected: When COORDINATE SYSTEM = 2
Field width: 7 digits
Tolerance: +/- 140 feet
Values: 0000000-9999999

4.5.12 GPS ELEVATION (CORE 1.19.16)
[PLOT.GPS_ELEV]
[GPS_PNWRS.GPS_ELEV]

Record the elevation above mean sea level, in feet, as determined by GPS.

When collected: When GPS UNIT = 1, 2 or 4
Field width: 6 digits (1st digit is + or -, last 5 digits are numeric)
Tolerance: +/- 280 feet
Values: -00100 to 20000

4.5.13 GPS ERROR (CORE 1.19.17)
[PLOT.GPS_ERROR]
[GPS_PNWRS.GPS_ERROR]

Record the error as shown on the GPS unit to the nearest foot. As described in Section 4.4.2, make every effort to collect readings only when the error less than or equal to 70 ft. However, if after trying several different times during the day, at several different locations, this is not possible, record reading with an error of up to 999 ft.

When collected: When GPS UNIT =1 or 2
Field width: 3 digits
Tolerance: No errors
Values: 000 - 999
(071 to 999 if an error of less than 70 cannot be obtained)

4.5.14 NUMBER OF READINGS (CORE 1.19.18)
[PLOT.GPS_NBR_READINGS]
[GPS_PNWRS.GPS_NBR_READINGS]

Record a 3-digit code indicating how many readings were averaged by the GPS unit to calculate the plot coordinates. Collect at least 180 readings if possible.

When collected: When GPS UNIT = 1 or 2
Field width: 3 digits
Tolerance: No errors
Values: 001 to 999

4.5.15 ANTENNA HEIGHT (AFSL/HAWAII)

[GPS_PNWRS.GPS_ANTENNA_HT_PNWRS]

Record the ANTENNA HEIGHT of the Survey Grade GPS Unit to the nearest 1/100 foot. Include the decimal point.

When collected: All records where GPS UNIT TYPE = 3 **AND** GPS LOCATION TYPE = 15, 16, 17, or 18
Field Width: 4 digits (including decimal point)
Tolerance: No Errors
Values: 0.01 to 9.99 feet

4.5.16 TIME RECORDING STARTED (AFSL/HAWAII)

[GPS_PNWRS.GPS_RECORDING_START_TIME_PNWRS]

Record the time that the Survey Grade GPS unit started recording. Record military (24 hour) time in hours and minutes (HHMM).

When collected: All records where GPS UNIT TYPE = 3 **AND** GPS LOCATION TYPE = 15, 16, 17, or 18
Field Width: 4 digits
Tolerance: No Errors
Values: 0000 to 2359

4.5.17 TIME RECORDING STOPPED (AFSL/HAWAII)

[GPS_PNWRS.GPS_RECORDING_END_TIME_PNWRS]

Record the time that the Survey Grade GPS unit stopped recording. **This must be at least 15 minutes after the time recorded in TIME RECORDING STARTED**. Record military (24 hour) time in hours and minutes (HHMM).

When collected: All records where GPS UNIT TYPE = 3 **AND** GPS LOCATION TYPE = 15, 16, 17, or 18
Field Width: 4 digits
Tolerance: No Errors
Values: 0000 to 2359, at least 15 minutes later than TIME RECORDING STARTED

4.5.18 YEAR (AFSL/HAWAII)

[GPS_PNWRS.GPS_MEASYEAR_PNWRS]

Record the year that Survey Grade GPS Coordinates were collected

When collected: All plots where GPS UNIT TYPE = 3 **AND** GPS LOCATION TYPE = 15, 16, 17, or 18
Field width: 4 digits
Tolerance: No errors
Values: $\geq$ 2012

4.5.19 MONTH (AFSL/HAWAII)

[GPS_PNWRS.GPS_MEASMON_PNWRS]

Record the month that Survey Grade GPS Coordinates were collected

When collected: All plots where GPS UNIT TYPE = 3 **AND** GPS LOCATION TYPE = 15, 16, 17, or 18
Field width: 2 digits
Tolerance: No errors

Values:

January	01	May	05	September	09
February	02	June	06	October	10
March	03	July	07	November	11
April	04	August	08	December	12

4.5.20 DAY (AFSL/HAWAII)
[GPS_PNWRS.GPS_MEASDAY_PNWRS]

Record the day of the month that Survey Grade GPS Coordinates were collected

When collected: All plots where GPS UNIT TYPE = 3 **AND** GPS LOCATION TYPE = 15, 16, 17, or 18
Field width: 2 digits
Tolerance: No errors
Values: 01 to 31

4.5.21 CREW NUMBER (AFSL/HAWAII)
[GPS_PNWRS.CREWNBR1]

Record the CREW NUMBER of the person on the field crew recording GPS Coordinates with the Survey-Grade receiver at the subplot.

When collected: When GPS UNIT TYPE = 3 **AND** GPS LOCATION TYPE = 15, 16, 17, or 18
Field Width: 6 digits
Tolerance: No errors
Values: PNW 260000 – 269999

4.5.22 GPS NOTES (PNW)
[GPS_PNWRS.NOTES]

Record any notes needed to clarify or explain a special situation in the particular GPS record being defined

When collected: As needed: required when GPS LOCATION TYPE 7 or GPS UNIT TYPE = 0
Field width: 2000 characters
Tolerance: N/A
Value: Words or abbreviated sentences

4.6 Correction For Offset Location

At times coordinates may be taken at a location other than plot center (an "offset location") (GPS LOCATION TYPE = 3) or subplot center (GPS LOCATION TYPE = 15, 16, 17, or 18). Record the two data items below.

4.6.1 AZIMUTH TO CENTER (CORE 1.19.14)
[PLOT.GPS_AZM]
[GPS_PNWRS.GPS_AZM]

For non-survey grade GPS units record the azimuth from the location where coordinates were collected to actual **plot center**. If coordinates are collected at plot center, record 000. ***For survey grade GPS units*** record the azimuth from the location where coordinates were collected to actual **subplot center.** If coordinates are collected at subplot center, record 000.

When collected: When GPS LOCATION TYPE = 3, 15, 16, 17, or 18and GPS UNIT = 2, 3 or 4
Field width: 3 digits
Tolerance +/- 3 degrees
Values:

000 when coordinates **are** collected at plot center (GPS LOCATION TYPE = 3) or subplot center (GPS LOCATION TYPE = 15, 16, 17, or 18)
001 to 360 when coordinates **are not** collected at plot center (GPS LOCATION TYPE = 3) or subplot center (GPS LOCATION TYPE = 15, 16, 17, or 18)

4.6.2 DISTANCE TO CENTER (CORE 1.19.15)

[PLOT.GPS_DIST]
[GPS_PNWRS.GPS_DIST]

For non-survey grade GPS units record the horizontal distance**, to the nearest foot**, from the location where coordinates were collected to the actual plot center. If coordinates are collected at plot center, record 000 as described in Section 4.4.2, if a Laser range finder is used to determine DISTANCE TO PLOT CENTER, offset locations may be up to 999 feet from the plot center. If a range finder is not used, the offset location must be within 200 ft. ***For survey grade GPS units*** record the horizontal distance, **to the nearest 1/10 foot**, from the location where Survey Grade GPS Coordinates were collected to the subplot center. This distance should be within 99.9 feet. If coordinates are collected at subplot center, record 000.0

When collected: When GPS LOCATION TYPE = 3, 15, 16, 17, or 18and GPS UNIT = 2, 3 or 4
Field width: 4 digits (including decimal place) for GPS LOCATION TYPE 15, 16, 17, or 18
3 digits (no decimal place) for GPS LOCATION TYPE 3
Tolerance: +/- 6 feet (When GPS LOCATION TYPE = 3)
Values:

The following are recordable values when GPS LOCATION TYPE = 3:

000 when coordinates **are** collected at plot center
000 to 200 when a Laser range finder **is not** used to determine distance
000 to 999 when a Laser range finder **is** used to determine distance

The following are recordable values when GPS LOCATION TYPE = 15, 16, 17, or 18:

000.0 when coordinates **are** collected at subplot center
000.1 to 099.9 when coordinates **are not** collected at subplot center

5 CONDITION CLASS DATA

The Forest Inventory and Analysis (FIA) plot is a cluster of four subplots *arranged* in a fixed pattern. *A plot may straddle more than one condition class; subplots are never moved or reconfigured in order to confine all four subplots to a single condition class*. Every plot *has* at least one condition class: the condition class present at plot center (*PC,* the center of subplot 1). Condition class attributes record information about forest structure, composition, and disturbance. This information allows researchers to group and analyze similar forest types, understand management practices used by different landowners, examine the effects of disturbance, and classify land types.

One of the core missions of the FIA program is to estimate and account for changes in forest land. Condition remeasurement protocol and associated data items are designed to allow PNW-FIA to develop change estimates for forest land and timberland by owner groups. Because PNW-FIA reports on the current status by FOREST TYPE, STAND SIZE CLASS, REGENERATION STATUS and TREE DENSITY, new reconcilable data items, including CONDITION CLASS STATUS, OWNER GROUP and RESERVED STATUS, are added to capture condition class changes and trends.

5.1 Determination of Condition Class

Step 1: Delineate the plot area by CONDITION CLASS STATUS

The first attribute considered when defining a condition class is CONDITION CLASS STATUS. The area sampled by a plot is assigned into condition classes based upon the following differences in CONDITION STATUS:

1. Accessible forest land
2. Nonforest land
3. Noncensus water
4. Census water
5. Nonsampled – possibility of forest land

Forest land and measurable nonforest land define the population of interest for FIA purposes. *These are* the areas where most of the data collection is conducted.

Step 2: Further subdivide Accessible Forest Land by *six* delineation variables

Any condition class sampled as accessible forest land may be further subdivided, in order of listed priority, into smaller condition classes if distinct, contrasting condition classes are present because of variation within the sampled area in any of the following attributes within the sample area:

1. RESERVED STATUS
2. OWNER GROUP
3. FOREST TYPE
4. STAND SIZE CLASS

5. REGENERATION STATUS
6. TREE DENSITY

No other attribute shall be the basis for recognizing contrasting accessible forest land condition classes. For each condition class recognized, several "ancillary attributes" that help describe the condition will be collected, but will not be used for delineation purposes. See ANCILLARY (NON-DELINEATING) DATA ITEMS, Section 5.6.5, for more information.

Note: All condition classes delineated within the 24-foot fixed-radius are mapped on the plot card. See Chapter 7, Boundary References, for instruction on how to map condition class boundaries.

5.2 Condition Status Definitions

5.2.1 Accessible Forest Land

Accessible forest land is land that is within the population of interest, is accessible, is on a subplot that can be occupied at subplot center, can safely be visited, and meets the following criteria:

The condition is at least 10-percent crown cover by trees of any size *(Appendix 1, Tree Species Lists)* or has been at least 10-percent crown cover in the past. Additionally, the condition is not subject to nonforest use(s) that prevent normal tree regeneration and succession such as regular mowing, intensive grazing, or recreation activities.

To qualify as forest land, the prospective condition must be at least 1.0 acre in size or and 120.0 feet wide measured stem-to-stem from the outer-most edge. Forested strips must be 120.0 feet wide for a continuous length of at least 363.0 feet in order to meet the acre threshold. Forested strips that do not meet these requirements are classified as part of the adjacent nonforest land.

Transition zones and forest/nonforest encroachment – When an accessible forest land condition encroaches into a nonforest land condition, the border between forest and nonforest is often a gradual change in tree cover with no clear and abrupt boundary. In addition, it may be difficult to determine exactly where the forested area meets the minimum cover criteria and where it does not. For these cases, determine where the land clearly meets the 10 percent minimum crown cover, and where it clearly is less than required crown cover;

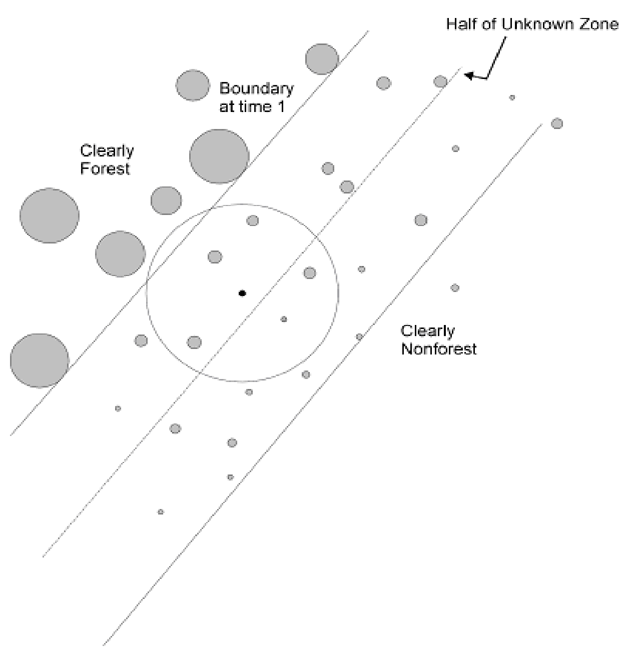


Figure 5.1: Example of classifying the condition class of the subplot in a transition zone with forest/nonforest encroachment.

divide the zone between these points in half, and determine the side of the zone on which the subplot center is located. Classify the condition class of the subplot based on this line (Figure 5.1).

> For example, at measurement time 1, a clear and distinct boundary existed between the forest and nonforest condition classes. At time 2, however, there now exists a zone of regeneration or small diameter trees between the previous forest condition and where the nonforest clearly remains. If the zone of encroachment clearly has 10 percent crown cover where it meets the nonforest, classify the entire zone as forest. If the zone is clearly nonforest up to the original stand, call it all nonforest. If the encroachment or transition zone does not clearly have 10 percent crown cover where it meets the nonforest, determine where it clearly has 10 percent crown cover (forest) and where it clearly does not have 10 percent crown cover (nonforest); divide this zone in half, and classify the entire subplot based on which side of the line the subplot center falls.

Treated strips – Occasionally, crews will come across plantations of trees, in which rows of trees alternate with strips of vegetation that have been bulldozed, mowed, tilled, treated with herbicide, or crushed. Because these strip treatments are conducted to optimize growth or to release the stand, the areas are considered forest land, and the treatment is considered a timber stand improvement operation. Do not confuse these practices with similar treatments on nonforest lands such as yards or rights-of-way. Contact with the landowner may help determine the intent of a treatment.

Indistinct boundary due to the condition minimum-width definition – Do not subdivide subplots where a condition class may change due only to the forest vs. nonforest minimum width (120.0 feet) definition. Although the point where the definition changes from forest to nonforest creates an invisible "line" between conditions, this definitional boundary is not distinct and obvious. See Figure 5.2 and Figure 5.3. Where the point of the definition change occurs on the subplot, determine only if the subplot center is on the forest or nonforest side of that approximate boundary, and classify the entire subplot based on the condition of the subplot center. If the boundary crosses through the center of the subplot, classify the subplot as the condition it most resembles. If the boundary occurs between subplots, classify each subplot based on its relation to the definitional boundary.

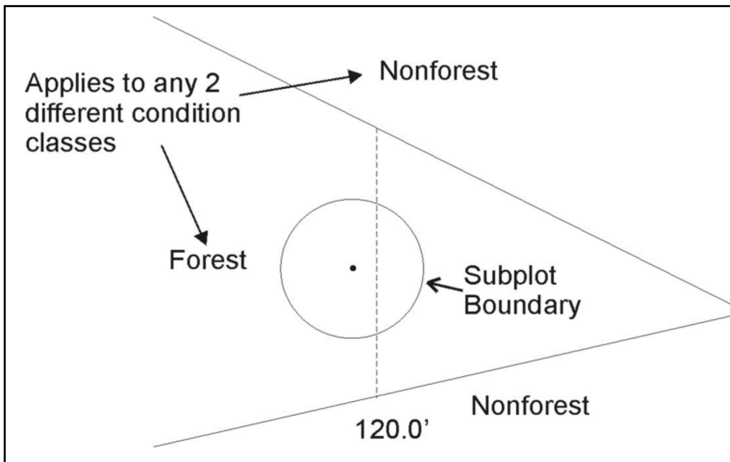


Figure 5.2: Forest condition narrows within a nonforest land condition. Examine the location of the subplot center in reference to the approximate line where the forest narrows to 120.0 ft wide. In this example, the entire subplot is classified as forest.

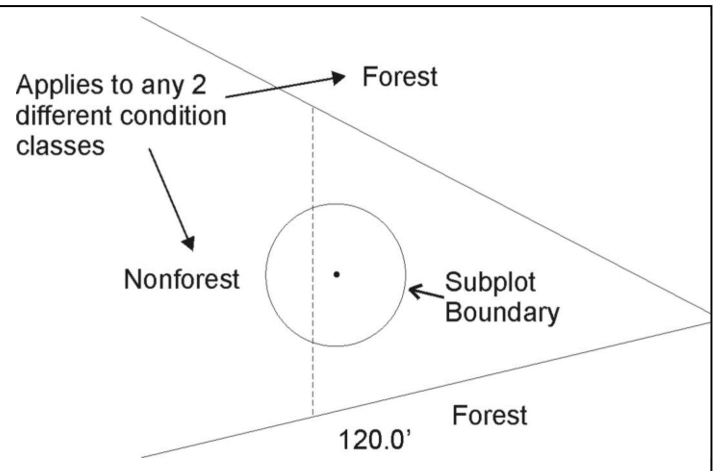


Figure 5.3: Nonforest land condition narrows within a forest condition. Examine the location of the subplot center in reference to the approximate line where the nonforest narrows to 120.0 ft wide. In this example, the entire subplot is classified as forest.

5.2.2 Nonforest Land

Nonforest land is any land within the sample that does not meet the definition of accessible forest land or any of the CONDITION STATUS values defined in Sections 5.2.3 through 5.2.4 as noncensus or Census water. To qualify, the area must be at least 1.0 acre in size and 120.0 feet wide, with five exceptions are discussed at the beginning of section 5.4, *DELINEATING CONDITION CLASSES WITHIN ACCESSIBLE FOREST LAND*. Do not consider evidence of "possible" or future development or conversion. A nonforest land condition will remain in the sample and will be examined at the next occasion to see if it has become forest land.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1); or all accessible nonforest land condition classes when nonforest is being sampled (NONFOREST CONDITION CLASS SAMPLING STATUS =1)

Delineate all nonforest condition classes on ground visited subplots when an accessible forest land condition or a measurable nonforest condition class is present within the 24-foot fixed-radius plot (see Section 5.6.6, DETERMINING CONDITION CLASSES ON NONFOREST LAND).

Example: If accessible forest land, nonforest urban land, and nonforest cropland are all present within a 24-foot fixed-radius subplot, map the forest land condition and map each nonforest land use as a separate condition class.

Note: For the Pacific Islands, an accessible condition class that meets the definition of NONFOREST LAND, is not intensively managed by humans for a nonforest land use (PRESENT NONFOREST LAND USE 18-26, 42, or 45, listed in section 5.6.6.1), and has greater than or equal to 10 percent vascular vegetation cover will be considered a measurable nonforest condition (NONFOREST SAMPLING STATUS = 1)." Certain data items are recorded in measurable nonforest conditions that are not typically measured in nonforest conditions; these are identified in the associated "when collected" field for individual data items.

When no accessible forest land condition or measurable nonforest condition classes exist within the 24-foot fixed-radius, record only the nonforest land use at the subplot center.

Plots that do not have accessible forest land or measurable nonforest condition classes that are entirely nonforest fall into one of the following three categories:

1. The plot is visited on the ground (SAMPLE METHOD CODE = 1).
   A plot file is created in the field data recorder. GPS coordinates are collected.
   Record the PRESENT NONFOREST LAND USE at each subplot center.
2. The plot is viewed from a distance (SAMPLE METHOD CODE = 2 or 4) A plot file is created in the field data recorder.
   No GPS coordinates are collected.
   Only one condition is recorded and the PRESENT NONFOREST LAND USE at plot center is designated for each subplot center.
3. The plot is not field visited or viewed from a distance. (SAMPLE METHOD CODE = 3 or 4) A plot data file is created in the office.
   No GPS coordinates are collected.

Only one condition is recorded and the PRESENT NONFOREST LAND USE at plot center is designated for each subplot center.

5.2.3 Noncensus Water

*Noncensus water includes l*akes, reservoirs, ponds, and similar bodies of water 1.0 acre to 4.5 acres in size*; and* rivers, streams, canals, etc. 30.0 feet to 200.*0* feet wide. The width of a water feature is measured between points on either side up to which water prevents the establishment and survival of trees (where nonforest land is mapped next to water, use the point where water prevents the establishment of woody vegetation or perennial terrestrial plants).

If a subplot center (including subplot 1) lands in noncensus water do not install the point, even if it can be occupied safely.

•No field measurements are made on that subplot.
•Establish and measure other subplots following normal procedures (see Section 3.7, Establishing Subplots when Plot Center is Inaccessible, for instructions on how to install a plot without access to plot center).

5.2.4 Census Water

*Census water includes ocean, l*akes, reservoirs, ponds, and similar bodies of water 4.5 acres in size and larger; and rivers, streams, canals, etc. more than 200 feet wide (1990 U.S. Census definition). The width of a water feature is measured between points on either side up to which water prevents the establishment and survival of trees (where nonforest land is mapped next to water, use the point where water prevents the establishment of woody vegetation or perennial terrestrial plants).

If a subplot center (including subplot 1) lands in Census water do not install the point, even if it can be occupied safely.

- No field measurements are made on that subplot.
- Establish and measure other subplots following normal procedures (see Section 3.7), Establishing Subplots when Plot Center is Inaccessible, for instructions on how to install a plot without access to plot center

5.2.5 Nonsampled

See CONDITION NONSAMPLED REASON *(Section 5.7.1)* for descriptions of land that qualifies as nonsampled. In cases where a condition is access-denied or hazardous land use, but obviously contains no forest land, record CONDITION CLASS STATUS = 2, 3 or 4. In cases where a condition is access-denied or hazardous land use and has the possibility of forest, record CONDITION CLASS STATUS = 5.

Nonsampled land (CONDITION CLASS STATUS = 5) may be subdivided into condition classes that are based on differences in nonsampled reason.

If a subplot center (including subplot 1) is located in any nonsampled area, as described in CONDITION NONSAMPLED REASON, the entire subplot is considered to be nonsampled. Record the attributes as described in Section 5.7, NONSAMPLED CONDITION CLASS ATTRIBUTES.

Establish and measure other subplots following normal procedures. A plot, subplot, or portion of a subplot is hazardous according to the crew's judgment.

If an entire plot is nonsampled, record only one nonsampled condition: the condition at plot center.

5.3 Delineating Condition Classes Differing In Condition Status:

The first step in delineating condition classes is to recognize differences in CONDITION CLASS STATUS. The most common difference is adjacent accessible forest land and nonforest land. Adjacent accessible forest land and nonforest land condition classes are recognized only if each of the two prospective condition classes is at least 1.0 acre in size, and each is at least 120.0 feet in width. These size and width minimums apply to both accessible forest land and nonforest land.

Within an accessible forest land condition class, unimproved roads, rock outcrops, and natural nonforest openings less than 1.0 acre in size and less than 120.0 feet in width are considered forest land and are not delineated and classified as a separate nonforest land condition class.

Within a nonforest land condition class, forested areas or linear strips of trees less than 1.0 acre in size and less than 120.0 feet in width are considered part of the nonforest land condition class.

Five exceptions to these size and width requirements apply:

A. Developed nonforest condition: human-caused nonforest land condition classes such as homes or cabins that are less than 1.0 ac in size and 120.0 feet in width and are surrounded by forest land. There are three kinds of developed nonforest conditions that do not have to meet area or width requirements (Figures 5.4 through 5.6). Improved roads: paved roads, gravel roads, or improved dirt roads regularly maintained for long-term continuing use by normal passenger vehicles. Generally constructed using machinery. The area where the original topography has been disturbed by cutbanks and fill is considered part of the road, if that area is maintained. Unimproved traces and roads created for skidding logs are not considered improved roads

B. Maintained rights-of-way: corridors created for railroads, power lines, gas lines, and canals that are periodically treated to limit the establishment and growth of trees and shrubs. Areas under power lines are considered maintained rights-of-way even if no current vegetation treatment is evident.

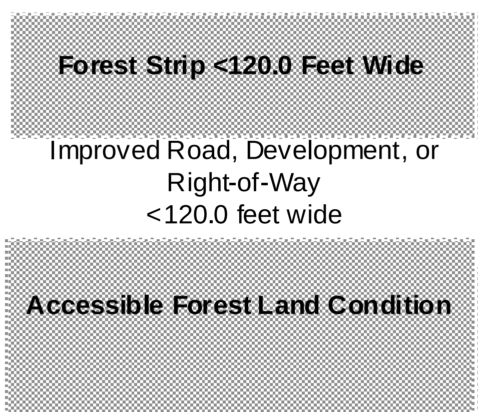


Figure 5.4: Example with a developed nonforest strip <120 feet wide. Forest strip, while <120 feet wide, is still part of the accessible forest land condition.

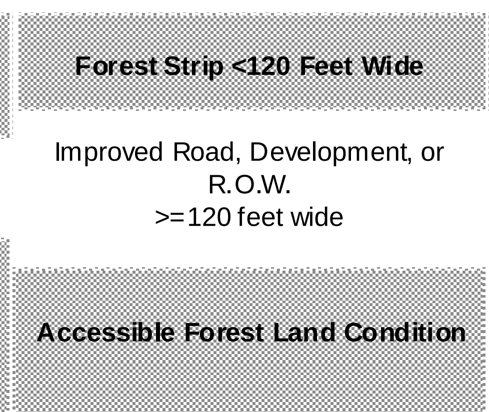


Figure 5.5: Example with a developed nonforest strip ≥120 feet wide. Forest strip is not part of the accessible forest land condition.

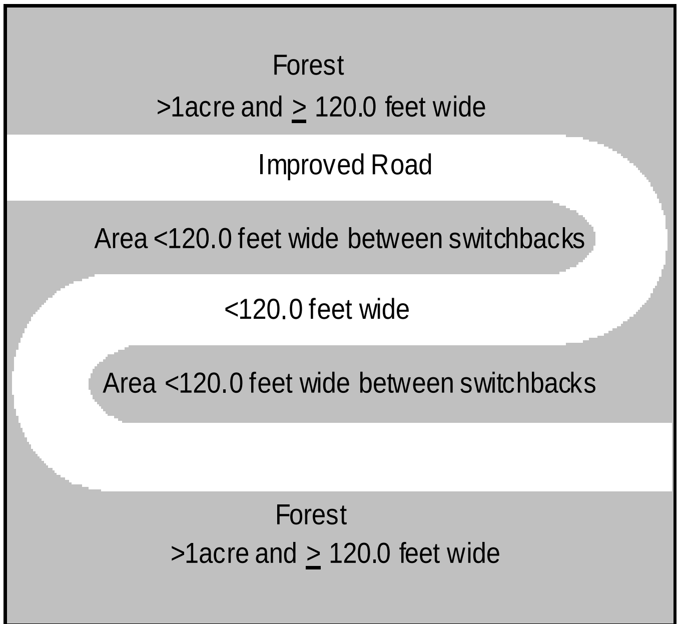


Figure: 5.6: Example of a switchback road where the area between the switchbacks is still forest land.

C. Developments: structures and the maintained area next to a structure, all less than 1.0 acre in size and surrounded by forest land. Examples of developments are houses or trailers on very small lots, communication installations in a small cleared area within forest land, and barns and sheds.

1. Distinct, alternating strips of forest and nonforest land: this situation occurs when a plot or subplot samples a condition class that is less than 1.0 acre in size and less than 120.0 feet in width. The condition class is one of a series of parallel strips of forest and nonforest land in which none of the strips meet the minimum width requirement. This exception applies only to nonforest land conditions that are not listed under *exception number*1, e.g., improved roads, maintained rights-of-way, and developments (Figure 5.4 and Figure 5.5).

Many small intermingled strips, determine the total area that the intermingled strips occupy, and classify according to the CONDITION CLASS STATUS (forest land or nonforest land) that occupies the

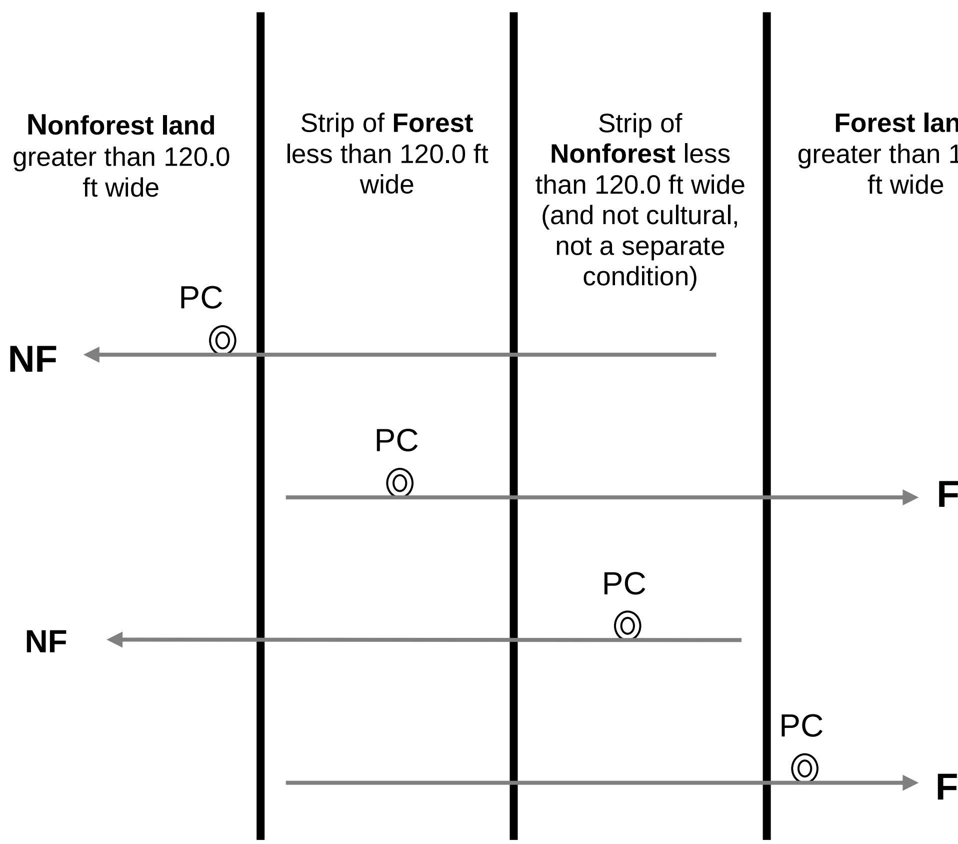


Figure 5.7: Example of alternating strips of forested and nonforested conditions. PC is the plot center (center of subplot 1).

greater area. If the area of intermingled strips is so large or indistinct as to make a total area determination impractical, then classify the sample as forest land.

For two alternating strips of forest and nonforest between two qualifying areas of nonforest land and forest land, see Figure 5.7. This figure delineates the boundary between the forest and nonforest land condition classes for four different examples. The plot center defines the plot condition for all strips covered by the arrow. Any subplot that falls in the alternating strips uses the rule. Any subplot that falls in assigned nonforest / forest is assigned that type. Again, this exception applies only to nonforest land conditions that are not listed under number 1, e.g., improved roads, maintained rights-of-way, and developments.

2.The 120 foot minimum width for delineation does not apply when a corner angle is 90 degrees or greater (see Figure 5.8).

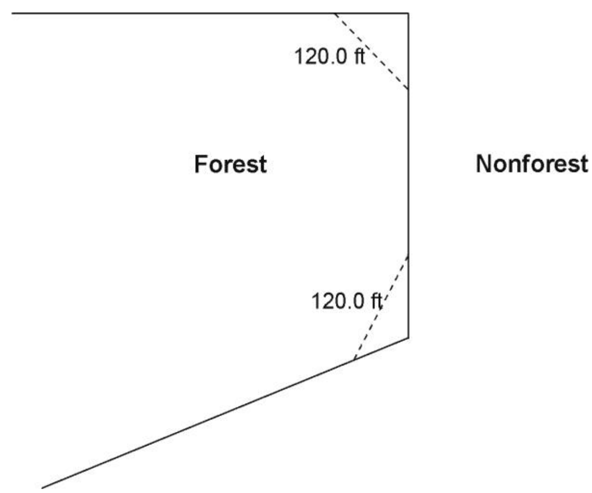


Figure 5.8: Illustration of the 90 degree corner rule. The dotted lines do not create nonforest conditions.

3.Linear water features: natural water features that are linear in shape such as streams and rivers. A linear water feature must meet the definition for Census or noncensus water to be nonforest area. Therefore, a linear water feature must be at least 30.0 feet wide and cover at least 1.0 acre. The width of a linear water feature is measured across its channel between points on either side up to which water prevents the establishment and survival of trees *(or other woody vegetation if the adjacent condition is nonforest).* To determine whether a linear water feature qualifies as *a separate condition class*, rely on all available information on hand such as aerial photos, topographic maps, past survey land calls, and ocular estimates at the current survey visit. Linear water features that do not meet the definition for Census or noncensus water should be classified as forest land only if bounded by forest land on both shores. Crews are NOT expected to measure the length of a linear water feature to determine if it meets the 1.0 acre requirement; use professional judgment and common sense on any linear water feature. A 30-foot wide stream needs to be 1452 feet long to be an acre in size.

4.Nonsampled conditions within accessible forest land are delineated, regardless of size, as a separate condition.

5.4 Delineating Condition Classes within Accessible Forest Land:

Accessible forest land is subdivided into condition classes that are based on differences in RESERVED STATUS, OWNER GROUP, FOREST TYPE, STAND SIZE CLASS, REGENERATION STATUS, and TREE DENSITY. Section 5.1, DETERMINATION OF CONDITION CLASS, applies when delineating contrasting forest condition classes. Specific criteria apply for each of the six attributes and are documented by attribute in sections within 5.6.4.1 (RESERVED STATUS) through 5.6.4.15 (TREE DENSITY). "Stands" are defined by plurality of crown cover for all live trees that are not overtopped.

Additionally, each separate forest condition class recognized within accessible forest land must be at least 1.0 acre in size and at least 120.0 feet in width. If prospective contrasting forest land condition classes do not each meet these minimum size and width requirements, the most similar prospective conditions should be combined until these minimums are attained.

No other attribute shall be the basis for recognizing contrasting condition classes within accessible forest land. For each condition class recognized, many "ancillary attributes" that help describe the condition will be collected, but will not be used for delineation purposes (see ANCILLARY (NON-DELINEATING) DATA ITEMS, Section 5.6.5).

General instructions for delineating condition classes within accessible forest lands:

1. Distinct boundary within a subplot or microplot-Separate condition classes ARE recognized if, within a subplot, or *microplot*, two (or more) distinctly different condition classes are present and delineated by a distinct, abrupt boundary. The boundary is referenced (see BOUNDARY REFERENCES, Chapter 7).

2. Indistinct boundary within a subplot- Separate condition classes are NOT recognized if the prospective condition classes abut along an indistinct transition zone, rather than on an abrupt, obvious boundary. Only one condition is recognized, and the subplot is classified entirely as the condition it most resembles.

   Example: The four subplots all sample only accessible forest land. Subplots 1, 3, and 4 sample what is clearly a stand of large-diameter trees. Subplot 2 falls in the middle of a stand-size transition zone. In the zone, the large-diameter stand phases into a sapling stand.

   Subplot 2 must not be divided into two condition classes on the basis of stand size. Instead, it is treated entirely as part of the large-diameter condition class or is assigned entirely to a new condition class that is classified as a seedling-sapling stand. The latter occurs only if the crew thinks the entire subplot is more like a stand of seedlings-saplings than a stand of large-diameter trees; then the boundary between the large- and small-diameter stands is assumed to occur between and not on the subplots.

   3. A boundary or transition zone between fixed radii plots that sample distinctly different condition classes**-** Separate condition classes are recognized and recorded when a valid attribute obviously differs between two fixed radius plots, but a distinct boundary or indistinct

transition zone exists outside the sampled (fixed-radius) area of the subplots. In such cases, a boundary, if present, is not referenced.

> Example: The northernmost subplot (2) samples entirely accessible forest land. The other three subplots, (1, 3, and 4) fall clearly in a nonforest meadow. Between subplot 1 and 2 is a transition zone; the number of trees present goes from none to what clearly represents at least 10 percent tree crown cover. Two condition classes are sampled: accessible forest land sampled on subplot 2, and nonforest land sampled on the other subplots.

4. Riparian forest area-A riparian forest area is defined as a forest area between 30.0 and 120.0 feet wide, and 1.0 acre or more in size(cumulative) and adjacent to but not necessarily present on both sides of a naturally occurring or artificially created body of water or watercourse with continuous or intermittent flow. Riparian forest areas may be associated with but not limited to streams, rivers, lakes, sloughs, seeps, springs, marshes, bogs, beaver ponds, sink holes, cypress domes and ponds, human-made ditches and canals. A riparian forest area must be associated "within forest" *(i.e., must be surrounded by forest on at least one side)* and contain at least one distinct and obvious change in a condition class delineation attribute from its adjacent accessible forest land condition class. *Figure 5.9 through Figure 5.14* provide examples of when to delineate riparian forest area as a separate condition class. This special size allowance for an accessible riparian forest land condition class only applies if the riparian area would otherwise meet the definition for accessible forest land (i.e., the riparian area meets crown cover requirements and is not subject to nonforest land uses as described in Section 5.6.6).

> Note: When the width of forest adjacent to a stream is between 120.0 feet and 150.0 feet and the width of the riparian forest is at least 30.0 feet wide, the rules for identifying the non-riparian forest (at least 30.0 feet but less than 120.0 feet) need to be modified. The non-riparian forest can be between 30.0 feet and 120.0 feet and mapped as a separate condition as long as it meets the criteria for delineating a separate condition class, otherwise it will be an inclusion in the riparian forest condition class.

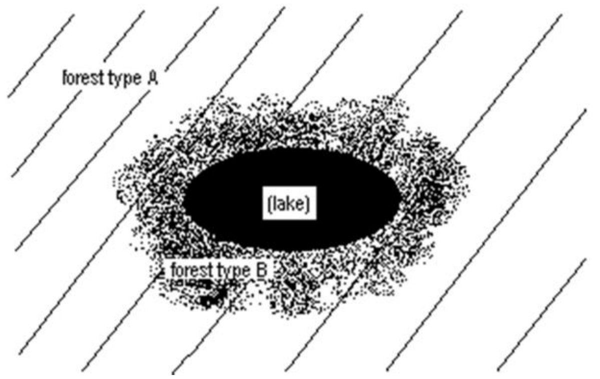


Figure 5.9: (CORE) FOREST TYPE B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

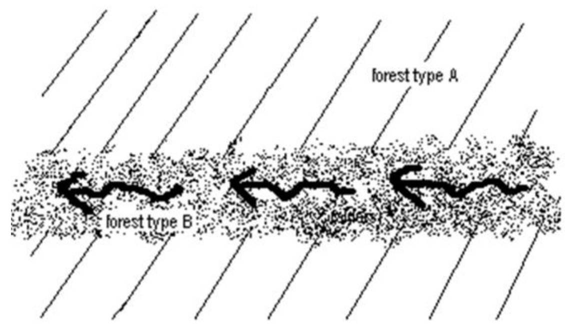


Figure 5.10: (CORE) FOREST TYPE B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

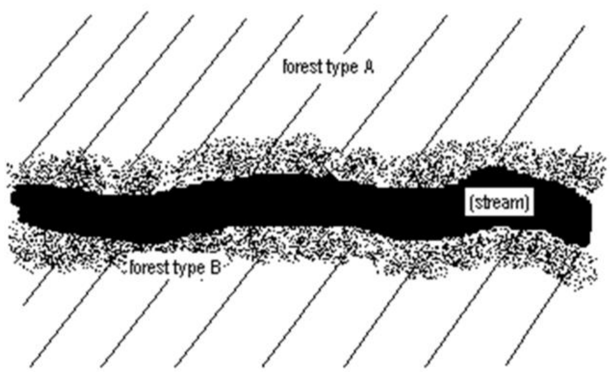


Figure 5.11: (CORE) If the stream is < 30.0 feet wide, FOREST TYPE B is a separate condition class (riparian) if the sum of the two widths of the bands, including the stream falls between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

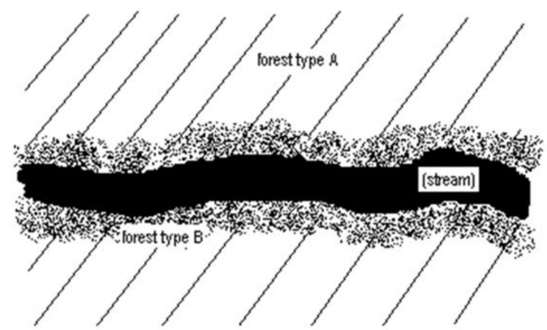


Figure 5.12: (CORE) If the stream is > 30.0 feet wide, FOREST TYPE B is a separate condition class (riparian) if either of the two widths of the bands falls between 30.0 feet and 120.0 feet wide and is ≥ 1.0 acre in size.

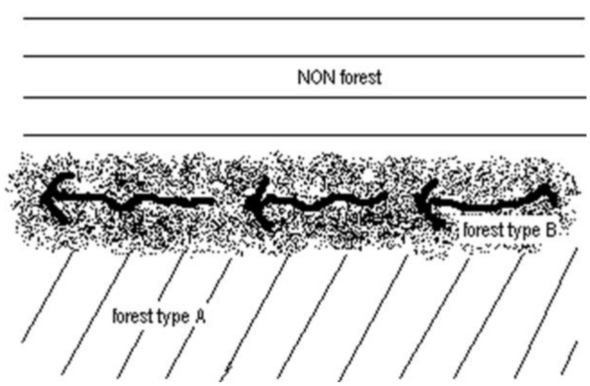


Figure 5.13: (CORE) FOREST TYPE B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

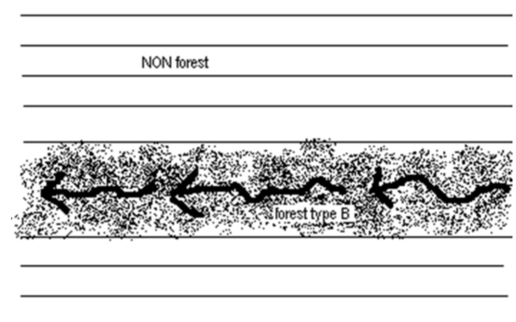


Figure 5.14 (CORE) In a nonforested area, a band of FOREST TYPE B that is < 120.0 feet wide is NOT considered a riparian area. It is not a separate condition class at all.

5.5 Condition Class Attributes List

A CONDITION CLASS NUMBER and a classification for CONDITION CLASS STATUS are required for every condition class sampled on a plot. For each condition class classified as accessible forest land, a classification is required for each of the following attributes:

5.6.4.1	RESERVED STATUS	ATTRIBUTES WHERE A CHANGE CAUSES A SEPARATE CONDITION CLASS
5.6.4.5	OWNER GROUP	
5.6.4.9	FOREST TYPE	
5.6.4.11	STAND SIZE CLASS	
5.6.4.13	REGENERATION STATUS	
5.6.4.15	TREE DENSITY	

5.6.5.1	OWNER CLASS	ANCILLARY CHANGES DO NOT DELINEATE A NEW *ACCESSIBLE FOREST LAND* CONDITION CLASS
5.6.5.3	PRIVATE OWNER INDUSTRIAL STATUS	
5.6.5.5	ARTIFICIAL REGENERATION SPECIES	
5.6.5.7	STAND AGE	
5.6.5.11	DOMINANT TREE SPECIES	
5.6.5.17	DISTURBANCE (up to 3 coded)	
5.6.5.19	DISTURBANCE YEAR (1 per disturbance)	
5.6.5.29	TREATMENT (up to 3 coded)	
5.6.5.31	TREATMENT YEAR (1 per treatment)	
5.6.5.9	PHYSIOGRAPHIC CLASS	
5.6.6.1	PRESENT NONFOREST LAND USE	
5.6.7.1	CAN OPY COVER SAMPLE METHOD	
5.6.7.2	LIVE CANOPY COVER	
5.6.7.3	LIVE PLUS MISSING CANOPY COVER=	
5.6.7.4	TOTAL STEMS	

Specific instructions for the classification of each attribute follow.

5.6 Condition Remeasurement

Identifying change between the previous and current inventories is a complex process that requires three steps. This process clearly separates previous crew error from physical change (on the ground) and procedural change.

Step 1. Correcting previous crew error

Verify that PREVIOUS CONDITION CLASS STATUS, PREVIOUS OWNER GROUP, and PREVIOUS RESERVED STATUS had been correct at the last installment. Review the previous mapping to determine if errors exist in the previous condition mapping. Identify and correct any boundary errors or condition status errors as early as possible. Do not change very small boundary errors (less than 10 percent area differences).

If you find any other error with any of the other previous condition delineating items, correct them only if you can determine that the previous crew was wrong. Generally, previous crew errors should rarely occur. Don't correct ancillary attributes which do not define the condition.

If any of the previous boundary mapping azimuths (left, right, or corner) or PREVIOUS CORNER DISTANCE are changed, the PREVIOUS CONDITION CLASS NUMBER (Section 5.6.3.2) of the trees on that subplot will have to be verified and manually reassigned.

Step 2. Map and record current conditions

Use the previous condition mapping (or corrected if changed in step 1) as a base for mapping the current condition. Boundaries and condition classes can be added or deleted, and condition class attributes can be altered. Record current CONDITION CLASS STATUS, OWNER GROUP, and RESERVED STATUS.

Step 3. Reconcile current with previous conditions

If the previous and current conditions are different for CONDITION CLASS STATUS, OWNER GROUP, or RESERVED STATUS, reconcile them as either physical change or procedural change. No other delineating data items need to be reconciled. Any previous crew errors should be changed in step 1. The data recorder will only prompt a change reconcile code if any of the above three data items are different.

5.6.1 CORRECTING PREVIOUS CREW ERROR

Previous crew errors can be corrected at any time, however, it is easier to correct them as early as possible. Before mapping the current condition on any subplot, review:

- All previous mapping
- PREVIOUS CONDITION CLASS STATUS
- PREVIOUS OWNER GROUP
- PREVIOUS RESERVED STATUS

Do not change any of these values if they were correct under the previous protocol; see Tables 5.1 and 5.2 for a list of procedural changes and manual clarifications. In addition, data item text from the previous inventory has been included for all condition class data items that can be updated; review the previous data item text before updating any data item values.

For example, if the previous crew deemed a condition to be forested because the land was (and still is) covered by curlleaf mountain-mahogany, do not change the PREVIOUS CONDITION CLASS STATUS to nonforest.

In past years, procedures affecting CONDITION CLASS STATUS, OWNER GROUP and RESERVED STATUS have been clarified.

For example, if a subplot center lands in noncensus or Census water, the entire subplot is considered noncensus or Census water. Sometimes field crews established the subplot when they could occupy the center because it was not covered by water at the time. This was clarified in a later manual as incorrect procedure; for the purpose of remeasurement, this is considered "crew error" and needs to be corrected.

Table 5.1: Procedural changes			
Relating to CONDITION CLASS STATUS, RESERVED STATUS, and OWNER GROUP:			
	Procedural Change Description	Affected species/parameters	Manual year
	If land was previously managed by a different agency, the owner group of the agency was recorded. Now the owner group of the owner is recorded.	OWNER GROUP = 10, 20 OR 30	2010
	RESERVED STATUS changed from being collected only when accessible forest land (CONDITION STATUS = 1) or measured nonforest land on Forest Service administered lands (CONDITION STATUS = 2 and ADMINISTRATIVE FOREST CODE = 501 - 650). Now it is collected on all conditions classes (CONDITION STATUS = 1, 2, 3, 4 or 5).	RESERVED STATUS	2008
	Changed forest land definition from minimum 5% cover to minimum 10% cover	CONDITION STATUS = 1 and 2	2012
Relating to non-delineating data items:			
	Two STAND SIZE CLASS rule dropped	STAND SIZE CLASS had to be two size classes away from initial size class to delineate a new condition class.	2004
	Added new NONFOREST LAND USE codes	Code 42: Vegetated Wetlands	2010
	Added new NONFOREST LAND USE codes	Codes 16: Maintained Wildlife Opening, 17: Windbreak/Shelterbelt, 34: Mining, 43: Beach	2011
	Changed DISTURBANCE Code	Code 55 for Erosion is now Code 56	2005
	Added new DISTURBANCE Code	Code 96: Tsunami	2012
	Changed OWNER CLASS Code	Code 34: Village has changed from code 46	2012

Adding or deleting previous conditions

Table 5.2: Manual clarifications that must be corrected		
Manual clarifications		Manual year
	If subplot center is in noncensus or Census water, the entire subplot is classified as noncensus or Census water and no mapping is done.	2003
	Areas under power lines are considered maintained rights-of-way	2002

The data recorder allows entire conditions to be added or deleted in order to correct a previous crew error. If a condition is added, all previous condition data items (such as PREVIOUS FOREST TYPE and PREVIOUS STAND SIZE CLASS) need to be updated to reflect the condition as it was at the previous measurement.

For example, if the previous crew missed that subplot 2 belonged to a different OWNER GROUP, add another condition in the previous condition class screen. Update the PREVIOUS OWNER GROUP, PREVIOUS OWNER CLASS, and PREVIOUS PRIVATE OWNER INDUSTRIAL STATUS (if applicable) to reflect correct owner information at the time of the previous inventory. All of the other condition data item values may be copied from the original condition if they are correct. If any of them are incorrect, update to reflect what it should have been at the time of the previous inventory. Include detailed notes explaining changes to any previous condition data items in PREVIOUS CONDITION NOTES.

Changing PREVIOUS CONDITION CLASS STATUS from nonforest to forest

If PREVIOUS CONDITION CLASS STATUS changes from nonforest to forest, use your best judgment to edit:

PREVIOUS FOREST TYPE
PREVIOUS STAND SIZE CLASS
PREVIOUS TREE DENSITY
PREVIOUS STAND AGE
PREVIOUS PHYSIOGRAPHIC CLASS

Edit PREVIOUS TREATMENTS only if you are sure they occurred before the previous inventory. Reconcile all trees on this condition that should have been measured previously as either “missed live” or “missed dead” (Section 8.4.1.11, RECONCILE (CORE 5.7.1)). Reconcile trees that grew enough to be a tally tree now but previously too small as either “ingrowth/reversions” or “through-growth.”

Changing PREVIOUS CONDITION CLASS STATUS from forest to nonforest

If the previous crew call is changed from forest to nonforest, reconcile all trees on that condition as
“cruiser error” (Section 8.4.1.11, RECONCILE (CORE 5.7.1)).

Changing previous boundary mapping

If the boundary mapped at the previous inventory (azimuths or PREVIOUS CORNER DISTANCE) is edited by the current crew, the data recorder will automatically delete the PREVIOUS CONDITION CLASS NUMBER for the trees tallied on that subplot. The current crew will have to manually assign those tallied trees to a PREVIOUS CONDITION CLASS NUMBER. If the subplot center PREVIOUS CONDITION CLASS NUMBER or PREVIOUS CONTRASTING CONDITION is changed, the data recorder will automatically update the PREVIOUS CONDITION CLASS NUMBER for trees tallied at the previous inventory on that subplot. If only condition level attributes are changed, the PREVIOUS CONDITION CLASS NUMBER does not have to be updated at all.

Minor changes of previous azimuths and PREVIOUS CORNER DISTANCE should be avoided. If the azimuth and distance are edited, the data recorder will automatically display a warning if the difference between previous crew mapping and edited mapping is less than 10 percent.

Explanatory Notes

If the current crew corrects any previous data items, an explanation describing why values were changed is required in the PREVIOUS CONDITION NOTES (Section 5.8.1). Include what was determined to be wrong and describe, in detail, the reason the current crew knows a previous error was made.

If a previous condition class is added, an explanation describing the reason for the addition is required in the PREVIOUS CONDITION NOTES (Section 5.8.1) Describe, in detail, the reason that the current crew knows a previous error was made.

If a previous condition class is deleted, an explanation describing the reason for the deletion is required in PLOT NOTES (Section 4.3.26). Describe, in detail, the reason the current crew knows a previous error was made.

5.6.2 RECONCILE CURRENT WITH PREVIOUS CONDITIONS

The purpose of the reconciliation is to distinguish physical (on the ground) change from any procedural change. For each subplot, the data recorder will calculate a change matrix that includes percent subplot area for each previous – current condition combination. If the previous and current condition values for CONDITION CLASS STATUS, OWNER GROUP, and RESERVED STATUS are not the same, the field crew must reconcile them as either physical or procedural change by recording the appropriate code for OWNER GROUP RECONCILE CODE, CONDITION CLASS STATUS RECONCILE CODE, RESERVED STATUS RECONCILE CODE. If they are the same, nothing has to be reconciled by the field crew.

Any changes (procedural or physical) for data items other than CONDITION STATUS, OWNER GROUP, and RESERVED STATUS are not reconciled.

Reconciliation example:

At time 1, the entire subplot is forested. At time 2 the field crew notices a recently built road.

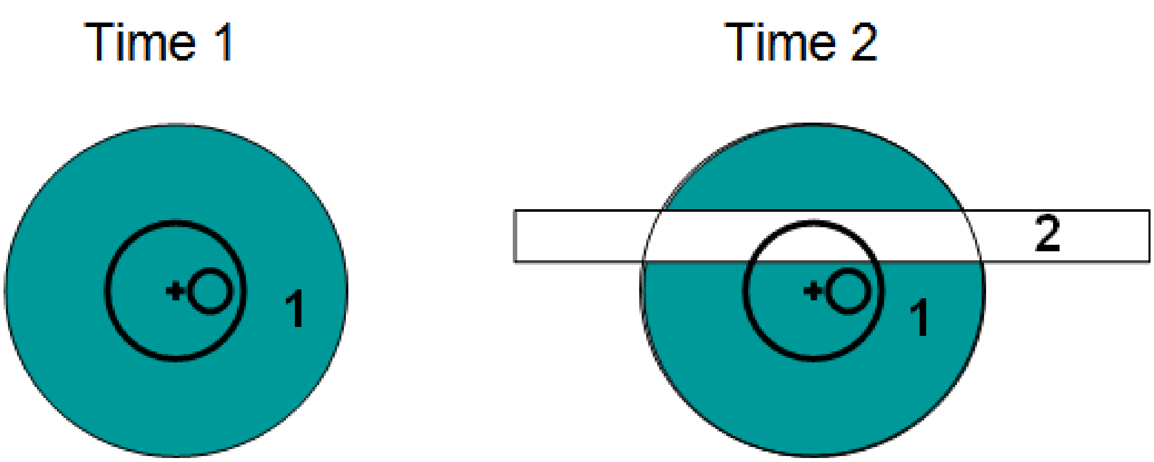


Table 5.3: Condition change matrix

PLOT TYPE	SUBPLOT NUMBER	CONDITION CLASS NUMBER		SUBPLOT CONDITION PROPORTION	CONDITION CLASS STATUS			OWNER GROUP			RESERVED STATUS		
		t1	t2		t1	t2	reconcile	t1	t2	reconcile	t1	t2	reconcile
3	1	1	1	0.92	1	1	0	40	40	0	0	0	0
3	1	1	2	0.08	1	2	1	40	40	0	0	0	0

Table 5.4: Condition change matrix key

t1: time 1 t2: time 2	
Reconcile codes:	
0	no change (auto-filled by data recorder)
1	physical change
3	procedural change

After mapping the current condition, the field crew reconciles the condition change. As displayed in the condition change matrix, the field crew only has to fill in the CONDITION CLASS STATUS RECONCILE CODE for the change from forest to road. All previous / current condition combinations with percent area of the plot are calculated by the data recorder. OWNER GROUP and RESERVED STATUS as well as the CONDITION CLASS STATUS for CONDITION CLASS NUMBER 1 (at time 1) to 1 (at time 2) are automatically reconciled by the data recorder with “0” (no change).Example 1:

Previous mapping
•At time 1, the entire plot was mapped as one forested condition on private land.

Current situation
•The entire plot is still forested. On subplot 2 the current crew maps a separate condition because part of that subplot has OWNER GROUP = 10 (Forest Service). At the reconciliation step, the data recorder prompts the crew to reconcile the change as either procedural or physical change. The crew determines that the Forest Service owned this land at the time of the previous visit.

What should you do?
•The crew needs to go back to step 1 and edit the previous (incorrect) condition class data items and boundary mapping. After editing the previous information, the data recorder will not prompt to reconcile any changes. Since a boundary was added, the PREVIOUS CONDITION CLASS NUMBER for trees tallied at time 1 will have to be manually entered.

Example 2:

Previous mapping
•On subplot 2, the previous crew mapped a meadow (less than 1 acre) that is surrounded by forest as a nonforest condition.

Current situation
•Nothing has changed on the plot.

What should you do?
•The previous mapping was incorrect because the meadow does not meet the size requirements to be considered a separate condition. It should have been included as part of the “forested condition”. The current crew should correct the previous crew error by deleting the boundary and assigning the entire subplot to the forested condition.

5.6.3 GENERAL CONDITION CLASS ATTRIBUTES

General attributes such as CONDITION CLASS NUMBER and a classification for CONDITION CLASS STATUS are required for every condition class sampled on a plot.

5.6.3.1 CONDITION CLASS NUMBER (CORE 2.4.1)

[COND.CONDID]
[CHANGE_MATRIX_PNWRS.CONDID]

On a plot, assign and record a number for each condition class. The condition class at plot center (the center of subplot 1) is designated condition class 1. Number condition classes sequentially as encountered going from subplot 1 through 4, numerically. For remeasurement plots retain the previous CONDITION CLASS NUMBER assignments whenever possible, even if they were assigned in the wrong order.
.

When collected: All condition classes
Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

5.6.3.2 PREVIOUS CONDITION CLASS NUMBER (PFSL/PACIFIC ISLANDS)

[PREV_COND_PNWRS.CONDID]
[CHANGE_MATRIX_PNWRS.PREV_CONDID]

A downloaded value that may be updated if an error was made by the previous crew. If updated, change the number for that condition class.

When collected: SAMPLE KIND = 2
Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

5.6.3.3 SUBPLOT CONDITION PROPORTION (PFSL/PACIFIC ISLANDS)

[CHANGE_MATRIX_PNWRS.PERCENT_AREA]

Proportion of macroplot/subplot condition for all previous and current condition class combinations, see RECONCILE CURRENT WITH PREVIOUS CONDITIONS, Subsection 5.6.2, and Table 5.3, “Condition change matrix”. This data item is calculated by the data recorder and displayed to the user.

When collected: SAMPLE KIND = 2 and condition change occurred
Field width: 3 digits
Tolerance: No errors
Values: 001 - 100

5.6.3.4 CONDITION CLASS STATUS (CORE 2.4.2)

[COND.COND_STATUS_CD]
[CHANGE_MATRIX_PNWRS.COND_STATUS_CD]

Record the code that describes the sampling status of the condition class. The instructions in Sections 5.3 and 5.5 apply when delineating condition classes that differ by CONDITION CLASS STATUS. In situations where a condition is denied access or hazardous, but obviously contains no forest land, record CONDITION CLASS STATUS = 2, 3 or 4. In cases where a condition is access-denied or hazardous land use and has the possibility of forest, record CONDITION CLASS STATUS = 5.

When collected: All condition classes
Field width: 1 digit
Tolerance: No errors
Values:

1 Accessible forest land
2 Nonforest land
3 Noncensus water
4 Census water
5 Nonsampled – possibility of forest land

5.6.3.5 PREVIOUS CONDITION CLASS STATUS (PFSL/PACIFIC ISLANDS)

[PREV_COND_PNWRS.COND_STATUS_CD]
[CHANGE_MATRIX_PNWRS.PREV_COND_STATUS_CD_PNWRS]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the code that describes the status of the condition at the previous measurement. Note: PREVIOUS CONDITION CLASS STATUS has already been updated to current codes.

When collected: SAMPLE KIND = 2
Field width: 1 digit
Tolerance: No errors
Values:

1 Accessible forest land
2 Nonforest land
3 Noncensus water
4 Census water
5 Nonsampled – possibility of forest land

5.6.3.6 CONDITION CLASS STATUS RECONCILE CODE (PFSL/PACIFIC ISLANDS)

[CHANGE_MATRIX_PNWRS.COND_STATUS_RECONCILE]

Record a code indicating which type of change to CONDITION CLASS STATUS occurred, physical or procedural. If a change occurred, CHANGE MATRIX NOTES must be recorded to describe what the change is (e.g., new road construction). Changes from "nonsampled" to “sampled” or from “sampled” to “nonsampled” are automatically reconciled by the data recorder with code 1 (physical change).

When collected: SAMPLE KIND = 2 and condition change occurred
Tolerance: No errors
Values:

Code	Change
0	No change
1	Physical change
3	Procedural change

5.6.3.7 CONDITION CLASS STATUS PROCEDURAL CHANGE CODE (PFSL/PACIFIC ISLANDS)
[CHANGE_MATRIX_PNWRS.COND_STATUS_PRCD_CHNG_REASN_CD]

Record a code indicating which procedural change occurred. Use code 99 (other) only if one of the codes procedural changes (code 1 or 2) does not apply.

When collected: CONDITION CLASS STATUS RECONCILE CODE = 3
Tolerance: No errors
Values:

Code	Change
03	Previously between 5% and 10% cover, but now less than 10% cover and no longer forest land
99	Other (explanatory CHANGE MATRIX NOTES required)

5.6.3.8 NONFOREST CONDITION CLASS STATUS (CORE 2.4.4)
[COND.NF_COND_STATUS_CD]

Record the code that describes the sampling status of the *measurable nonforest* condition class (see the NONFOREST CONDITION NONSAMPLED REASON CODES below for additional information).

When collected: When CONDITION CLASS STATUS = 2 and NONFOREST SAMPLING STATUS = 1
Field width: 1 digit
Tolerance: No errors
Values:

2	Accessible nonforest land
5	Nonsampled nonforest

5.6.3.9 NONFOREST CONDITION NONSAMPLED REASON (CORE 2.4.5)
[COND.NF_COND_NONSAMPLE_REASN_CD]

For portions of plots that are *measureable* nonforest land and can not be sampled (NONFOREST CONDITION CLASS STATUS = 5), record one of the following reasons. **In the Hawaiian Islands this will only be collected on Experimental Forest Lands. Other lands in the Pacific Islands, NONFOREST SAMPLING STATUS = 0.**

When collected: When CONDITION CLASS STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST CONDITION STATUS = 5.
Field width: 2 digits
Tolerance: No errors
Values:

02	Denied access – Any area within the sampled area of a plot to which access is denied by the legal owner, or to which an owner of the only reasonable route to the plot denies access. There are no minimum area or width requirements for a condition class delineated by denied access. Because a denied-access condition can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available.
03	Hazardous situation – Any area within the sampled area on plot that cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, temporary high water, etc. Although the hazard is not likely to change over time, a hazardous condition remains in the sample and is re-examined at the next occasion to determine if the hazard is still present. There are no minimum size or width requirements for a condition class delineated by a hazardous condition.
10	Other – This code is used whenever a condition class is not sampled due to a reason other than one of the specific reasons listed. *An electronic CONDITION CLASS NOTE* is required to describe the situation.

5.6.3.10 NONFOREST CONDITION CLASS SAMPLING STATUS (PNW)
[COND.NF_COND_SAMPLE_STATUS_CD_PNWRS]

Record a code that indicates whether this nonforest condition (CONDITION CLASS STATUS = 2) is part of a nonforest inventory. When a nonforest condition is within Experimental Forest boundaries, land meeting the accessible nonforest land definition that also has vascular vegetation cover greater than or equal to 10 percent is considered a measurable nonforest condition class (NONFOREST CONDITION CLASS SAMPLING STATUS = 1). Certain data items are recorded in NONFOREST CONDITION CLASS SAMPLING STATUS = 1 conditions which are not typically measured in nonforest conditions; these are identified in the associated “when collected” field for individual data items.

When collected: When NONFOREST CONDITION CLASS STATUS = 2
Field width: 1 digit
Tolerance: No errors
Values:

0	Nonforest conditions are not inventoried
1	Nonforest conditions are inventoried (only when condition falls on Experimental Forest land and vascular vegetation cover is greater than or equal to 10 percent).

5.6.4 ACCESSIBLE FOREST LAND DELINEATING DATA ITEMS

Data items described in this section determine if accessible forest land qualifies to be subdivided into separate condition classes, with the exception of PREVIOUS OWNER GROUP CORRECTED which serves as a code to confirm changes in owner group. Section 5.1, Determination of Condition Class, applies when delineating contrasting forest condition classes based on these data items.

5.6.4.1 RESERVED STATUS (Core 2.5.1)
[COND.RESERVECD]
[CHANGE_MATRIX_PNWRS.RESERVCD]

Record the code that identifies the reserved designation for the condition. Reserved land is withdrawn by law(s) prohibiting the management of land for the production of wood products (not merely controlling or prohibiting wood-harvesting methods). Such authority is vested in a public agency or department, and supersedes rights of ownership. The prohibition against management for wood products cannot be changed through decision of the land manager (management agency) or through a change in land management personnel, but rather is permanent in nature.
The phrase "withdrawn by law" includes as reserved land, parcels of private land with deeds that specifically prohibit the management of the tract for the production of wood products.

Note: the value of this data item may be downloaded (at least for condition class 1) for all plots. However, when field visited, check to be sure the value is correct for the condition.

When collected: All Plots (CONDITION CLASS STATUS is not null)
Field width: 1 digit
Tolerance: No errors
Values:

0 Not reserved
1 Reserved

5.6.4.2 PREVIOUS RESERVED STATUS (PFSL/PACIFIC ISLANDS)
[PREV_COND_PNWRS.RESERVCD]
[CHANGE_MATRIX_PNWRS.PREV_RESERVCD]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the code that identifies the reserved designation for the condition at the previous measurement.

When collected: SAMPLE KIND = 2
Field width: 1 digit
Tolerance: No errors
Values:

Code	Previous Reserved Status
0	Not reserved
1	Reserved

5.6.4.3 RESERVED STATUS RECONCILE CODE (PFSL/PACIFIC ISLANDS)
[CHANGE_MATRIX_PNWRS.RESERVCD_RECONCILE]

Record a code indicating which type of change to RESERVED STATUS occurred, physical or procedural. If a change occurred, CHANGE MATRIX NOTE must be recorded to describe what the change is (e.g., new wilderness area).

When collected: SAMPLE KIND = 2 and condition change occurred
Field width: 1 digit
Tolerance: No errors
Values:

Code	Previous Reserved Status
0	No change (reconciled by data recorder, not a valid code for field crew)
1	Physical change
3	Procedural change

5.6.4.4 RESERVED STATUS PROCEDURAL CHANGE REASON CODE (PFSL/PACIFIC ISLANDS)

[CHANGE_MATRIX_PNWRS.RESERV_PRCD_CHNG_REASN_CD]

This code indicates that an undefined procedural change occurred. Include notes to describe the procedural change. Note: There are currently no procedural changes for reserved status and the reconcile code "procedural change" should generally not be used for reserved status.

When collected: CONDITION CLASS STATUS RECONCILE CODE = 3
Field width: 2 digits
Tolerance: No errors
Values:

99 Other (explanatory CHANGE MATRIX NOTES required)

5.6.4.5 OWNER GROUP (CORE 2.5.2)

[COND.OWNGRPCD]
[CHANGE_MATRIX_PNWRS.OWNGRPCD]

Record the OWNER GROUP code identifying the ownership (or the managing Agency for public lands) of the land in the condition class. Separate conditions because of changes in OWNER GROUP are recognized only where differences can be clearly identified on the ground when visiting the plot (*e.g., blazed trees or posted boundary signs*).

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1) and nonforest land condition classes (CONDITION CLASS STATUS 2 or 5)
Field width: 2 digits
Tolerance: No errors
Values:

10 Forest Service
20 Other Federal
30 State and Local Government
40 Private

5.6.4.6 PREVIOUS OWNER GROUP (PFSL/PACIFIC ISLANDS)

[PREV_COND_PNWRS.OWNGRPCD]
[CHANGE_MATRIX_PNWRS.PREV_OWNGRPCD]

On remeasurement plots this item will be populated directly from the previous visits OWNER GROUP data item. Examine the PREVIOUS OWNER GROUP field and determine if it was correctly coded at the previous visit. **If the OWNER GROUP of the condition actually changed, do not update this field**; change will be captured by comparing OWNER GROUP at the prior visit to OWNER GROUP at the current visit. If the OWNER GROUP recorded at the previous inventory (i.e., PREVIOUS OWNER GROUP) was coded incorrectly use codes 10 through 40 to correct the downloaded code (indicating an error was made at the previous visit). An update to this field requires an explanatory note in the electronic PREVIOUS CONDITION CLASS NOTES.

When collected: SAMPLE KIND = 2 and previously accessible forest land condition classes (PREVIOUS CONDITION CLASS STATUS = 1) and nonforest land condition classes (PREVIOUS CONDITION CLASS STATUS 2 or 5).
Field width: 2 digits
Tolerance: No errors

Values:

Code	Description
10	Forest Service
20	Other Federal
30	State and Local Government
40	Private

5.6.4.7 OWNER GROUP RECONCILE CODE (PFSL/PACIFIC ISLANDS)

[CHANGE_MATRIX_PNWRS.OWNGRPCD_RECONCILE]

Record a code indicating which type of change to OWNER GROUP occurred, physical or procedural. If a change occurred, a CHANGE MATRIX NOTE must be recorded to describe what the change is (e.g., new road construction).

When collected: SAMPLE KIND = 2 and condition change occurred
Field width: 1 digit
Tolerance: No errors
Values:

Code	Previous Reserved Status
0	No change (reconciled by data recorder, not a valid code for field crew)
1	Physical change
3	Procedural change

5.6.4.8 OWNER GROUP PROCEDURAL CHANGE REASON CODE (PFSL/PACIFIC ISLANDS)

[CHANGE_MATRIX_PNWRS.OWNGRP_PRCD_CHNG_REASN_CD]

Record a code indicating which procedural change occurred. Use code 99 (other) only if the procedural change defined in code 01 does not apply.

When collected: OWNER GROUP RECONCILE CODE = 3
Field width: 2 digits
Tolerance: No errors
Values:

99 Other (explanatory CHANGE MATRIX NOTES required)

5.6.4.9 FOREST TYPE (PACIFIC ISLANDS)

[COND.FOREST_COMMUNITY_PNWRS]
[COND.FLDTYPCD]

<u>Record the code corresponding to the FOREST TYPE that best describes the species with the plurality of </u>cover<u> for all live tress in the condition class that are not overtopped.</u> The Pacific Island FOREST TYPES are taken from Mueller-Dombois and Fosberg, 1998.

The instructions in Sections 5.1, 5.3, and 5.4 apply when delineating, within accessible forest land, contrasting conditions based on differences in FOREST TYPE.

<u>If STAND SIZE CLASS is nonstocked, then FOREST TYPE is determined by the following hierarchy</u>:

> <u>For SAMPLE KIND = 2 plots, record the FOREST TYPE of the condition at the previous inventory</u>.

For all other plots:
1. Evaluate any seedings available to determine the FOREST TYPE.
2. If no seedlings exist, use adjacent stands and your best professional judgment to determine FOREST TYPE.

The instructions in Section 5.1, DETERMINATION of CONDITION CLASS and Section 5.5, CONDITION CLASS ATTRIBUTES apply when delineating, within accessible forest land, contrasting conditions based on differences in FOREST TYPE.

When collected: All accessible forest land or condition classes (CONDITION STATUS = 1)
Field width: 2 digits
Tolerance: No errors in group or type
Values:

1 Strand or halophytic vegetation - vegetation near the shore containing species adapted to high rates of evaporation by wind and to high salt concentrations from windblown ocean spray or inundation by salt water (Core Code 989 – Other Tropical Hardwoods).

2 Mangrove swamps – trees with high salt tolerance growing on tidally inundated shores and in landlocked depressions. Many species have pneumatophores, adaptive structures for aeration of waterlogged root systems (Core Code 982 - Mangrove).

3 Lowland tropical rainforest – multistoried forest with many canopy-dwelling epiphytes, open ground, and shrub layers. This forest community can extend up the lower slopes with windward rainy exposures (Core Code 987 – Lower Montane Wet and Rain Forest).

4 Montane rainforest –the predominant type on moist hilltops and mountain slopes in many tropical islands. Forests of low stature that are rich in shrubs and epiphytes (Core Code 987 – Lower Montane Wet and Rain Forest).

5 Cloud forest - These forests are covered with clouds or fog much of the time. The trees have low canopies and are often dripping with moisture. The trees are typically small-leafed and covered with masses of epiphytic mosses and liverworts, which also form a deep ground cover (Core Code 988 – Cloud Forest).

6 Mesophytic or moist forest – seasonally dry evergreen forests on leeward, drier slopes (Core Code.985 – Moist Forest).

7 Xerophytic – forests found on truly dry, rain-shadow, leeward mountain slopes and lowlands (Core Code.984 – Dry Forest).

8 Agroforestry – tree species are included in crop or animal production agricultural ecosystems (Core Code.989 – Other Tropical Hardwoods).

9 Plantations – an area planted with tree species for the purpose of timber production. Species planted are mainly eucalypt, mahogany, and pine species that replace indigenous forests and savannas (Core Code 989 – Other Tropical Hardwoods).

5.6.4.10 PREVIOUS FOREST TYPE (PFSL/PACIFIC ISLANDS) [PREV_COND_PNWRS.FOREST_COMMUNITY_PNWRS]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the code corresponding to the FOREST TYPE that best describes the species with the plurality of cover for all live trees in the condition class that were not overtopped at the previous measurement.

When collected: SAMPLE KIND = 2 and previously accessible forest land or condition classes (PREVIOUS CONDITION STATUS = 1)
Field width: 3 digits
Tolerance: No errors in group or type
Values: (See Section 5.6.4.9)

5.6.4.11 STAND SIZE CLASS (CORE 2.5.4)
[COND.FSLSZCD]

Record the code that best describes the predominant size class of all live trees in the condition class.

The instructions in *Section 5.1 and Section 5.5* apply when delineating, on accessible forest land, contrasting conditions based on differences in STAND SIZE CLASS.

Within the sampled area on a microplot, or subplot, recognize only very obvious contrasting stands of different mean diameter with an abrupt boundary. Example: an obvious abrupt boundary exists within the sampled (fixed-radius) area of a subplot and demarcates a STAND SIZE CLASS change. *When in doubt, do not split conditions.* Use tree crown cover of all live trees that are not overtopped to differentiate between stand-size classes.

When collected: All accessible forestland condition classes (CONDITION CLASS STATUS = 1)
Field width: 1 digit
Tolerance: No errors
Values:

Code	Stand Size Class	Definition
0	Nonstocked	Meeting the definition of accessible forest land, and the following applies:Less than 10 percent **crown cover** by trees of any size, and not classified as cover trees (see Code 6)
1	< 4.9 inches (seedling, sapling)	At least 10 percent crown cover in trees of any size; and at least 2/3 of the crown cover is in trees less than 5.0 inches DBH
2	5.0 - 8.9 inches (softwoods) 5.0 - 10.9 inches (hardwoods)	At least 10 percent crown cover in trees of any size; and at least 1/3 of the crown cover is in trees greater than or equal to 5.0 inches DBH and the plurality of the crown cover is in softwoods between 5.0 - 8.9 inches DBHand/or hardwoods between 5.0 - 10.9 inches DBH.
3	9.0 - 19.9 inches (softwoods) 11.0 - 19.9 inches (hardwoods)	At least 10 percent crown cover in trees of any size; and at least 1/3 of the crown cover is in trees greater than or equal to 5.0 inches DBH/DRC and the plurality of the crown cover is in softwoods between 9.0 - 19.9 inches DBHand/or hardwoods between 11.0 - 19.9 inches DBH.

4	20.0 - 39.9 inches	At least 10 percent crown cover in trees of any size; and at least 1/3 of the crown cover is in trees greater than or equal to 5.0 in*ches* DBH and the plurality of the crown cover is in trees between 20.0 - 39.9 in*ches* DBH
5	40.0 + inches	At least 10 percent crown cover in trees of any size; and at least 1/3 of the crown cover is in trees greater than or equal to 5.0 inches DBH and the plurality of the crown cover is in trees > 40.0 inches DBH
6	*(Office Use Only)* Cover trees (trees not on species list, used for plots classified as nonforest)	*(Office Use Only)* Less than 10 percent crown cover by trees of any size, and greater than 5 percent crown cover of species that comprise cover trees

5.6.4.12 PREVIOUS STAND SIZE CLASS (PFSL/PACIFIC ISLANDS) [PREV_COND_PNWRS.FLDSZCD]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the code that best describes the predominant size class of all live trees in the condition class that were not overtopped at the previous measurement.

When collected: SAMPLE KIND = 2 and accessible forestland condition classes (PREVIOUS CONDITION CLASS STATUS = 1).

Field width: 1 digit

Tolerance: No errors

Values:

Code	Stand Size Class	Definition
0	Nonstocked	Meeting the definition of accessible forest land, and one of the following applies: (a) less than 10 percent crown cover by trees of any size, and not classified as chaparral, or (b) for forest types where crown cover standards are not available, less than 5 percent crown cover of trees of any size.
1	< 5.0 inches (seedling, sapling)	At least 10 percent crown cover (or 5 percent crown cover if stocking tables are not available) in trees of any size; and at least 1/3 of the crown cover is in trees less than 5.0 inches DBH
2	5.0 - 8.9 inches (softwoods) 5.0 - 10.9 inches (hardwoods)	At least 10 percent crown cover (or 5 percent crown cover if stocking tables are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH and the plurality of the crown cover is in softwoods between 5.0 - 8.9 inches DBH and/or hardwoods between 5.0 - 10.9 inches DBH.
3	9.0 - 19.9 inches (softwoods) 11.0 - 19.9 inches (hardwoods)	At least 10 percent crown cover (or 5 percent crown cover if stocking tables are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH and the plurality of the crown cover is in softwoods between 9.0 - 19.9 inches DBH.and/or hardwoods between 11.0 - 19.9 inches DBH

4	20.0 - 39.9 inches	At least 10 percent crown cover (or 5 percent crown cover if stocking tables are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH and the plurality of the crown cover is in trees between 20.0 - 39.9 inches DBH
5	40.0 + inches	At least 10 percent crown cover (or 5 percent crown cover if stocking tables are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH and the plurality of the crown cover is in trees > 40.0 inches DBH

5.6.4.13 REGENERATION STATUS (CORE 2.5.5)
[COND.STDORGCD]

Record the code that best describes the artificial regeneration that occurred in the condition.

The instructions in Sections 5.1, *DETERMINATION OF CONDITION CLASS* and Section 5.3, *DELINEATING CONDITION CLASSES DIFFERING IN CONDITION CLASS* STATUS apply when delineating, within accessible forest land, contrasting conditions based on differences in REGENERATION STATUS.

For a forest land condition to be delineated and/or classified as artificially regenerated, the condition must show distinct evidence of planting or seeding. If it is difficult to determine whether or not a stand has been planted or seeded, then use code 0. If no distinct boundary exists within the sampled (fixed-radius) area on any subplot, then do not recognize separate conditions. In many regions of the West, trees are not planted in rows, and planted stands do not differ in physical appearance from natural conditions. In these cases, there is no need to differentiate conditions based on stand origin.

Note: Plot records or verbal evidence from landowner is acceptable for determining regeneration status.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)
Field width: 1 digit
Tolerance: No errors
Values:

0	Natural	Present stand shows no clear evidence of artificial regeneration. Includes unplanted, recently cut lands.
1	Artificial	Present stand shows clear evidence of artificial regeneration.

5.6.4.14 PREVIOUS REGENERATION STATUS (PFSL/PACIFIC ISLANDS)
[PREV_COND_PNWRS.STDORGCD]

A downloaded value that may need to be updated if an error was made by the previous crew. If updated, record the code that best describes the degree of evidence of artificial regeneration which occurred in the condition at the previous measurement.

When collected: SAMPLE KIND = 2 and accessible forestland condition classes (PREVIOUS CONDITION CLASS STATUS = 1).

Field width: 1 digit
Tolerance: No errors
Values: See REGENERATION STATUS

5.6.4.15 TREE DENSITY (CORE 2.5.6)
[COND.MAPDEN]

Record a code to indicate the relative tree density classification. Base the classification on the number of stems/unit area, basal area, or tree cover of all live trees in the condition that are not overtopped, compared to any other condition class TREE DENSITY recorded *on the plot*.

The instructions in Sections 5.1, DETERMINATION OF CONDITION CLASS and Section 5.4, DELINEATING CONDITION CLASSES WITHIN ACCESSIBE FOREST LAND apply when delineating, within accessible forest land, contrasting conditions based on differences in TREE DENSITY.

Codes 2 and higher are used ONLY when all other attributes used to delineate separate condition classes are homogenous, i.e., when a change in density is the ONLY difference within what would otherwise be treated as only one forest condition. Otherwise, code 1 for all condition classes. Codes 2 and higher are usually, but not always, used to demarcate areas that differ from an adjacent area due to forest disturbance, e.g., a partial harvest or heavy, but not total tree mortality due to a ground fire. Delineation by density should only be done when the less-dense condition is 50 percent or less as dense as the more dense condition.

Do not distinguish between low-stocked stands or stands of sparse and patchy forest.

In order to qualify as a separate condition based on density, there MUST be a distinct, easily observed change in the density of an area's tree cover or basal area.

Examples of valid contrasting conditions defined by differences in tree density are:

- the eastern half of an otherwise homogeneous, 20-acre stand has many trees killed by a bark beetle outbreak,
- one portion of a stand is partially cut over (with 40 square feet basal area per acre) while the other portion is undisturbed (with 100 square feet basal area per acre).

NOTE: In these examples, RESERVED STATUS, OWNER GROUP, FOREST TYPE, STAND SIZE CLASS, and REGENERATION STATUS are the same.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)
Field width: 1 digit
Tolerance: No errors
Values:

1	Initial density class
2	Density class 2 - density different than 1
3	Density class 3 - density different than 1 and 2

5.6.4.16 PREVIOUS TREE DENSITY (PFSL/PACIFIC ISLANDS)
[PREV_COND_PNWRS.MAPDEN]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record a code to indicate the relative tree density classification at the previous measurement.

When collected: SAMPLE KIND = 2 and previous accessible forestland condition classes (PREVIOUS CONDITION CLASS STATUS = 1).
Field width: 1 digit
Tolerance: No errors
Values: See TREE DENSITY

5.6.5 ANCILLARY (NON-DELINEATING) DATA ITEMS

5.6.5.1 OWNER CLASS (CORE 2.5.7)
[COND.OWNCD_PNWRS]

Record the OWNER CLASS code that best corresponds to the ownership of the land in the condition class. Conditions will **NOT** be delineated based on changes in OWNER CLASS. If multiple owner classes within a group occur on a single condition class, record the OWNER CLASS closest to the plot center.

Note: When federal land is owned and administered by two separate entities (e.g., BLM and Forest Service), this data item records the legal owner of the land, not the administrator.

The value for this field should be downloaded for condition class 1 and indicates the owner classification collected for subplot 1 center (the pinpricked field grid location). However, check to be sure the value is correct for the plot and update this code if incorrect. If the difference is due to a change in ownership since the last field visit, record the date of the ownership change (if known), and make a note in CONDITION CLASS NOTES (Section 5.8.2).

When collected: All accessible forest land (CONDITION CLASS STATUS =1) and nonforest land condition classes (CONDITION STATUS = 2 or 5)
Field width: 2 digits
Tolerance: No errors
Values:

		Core Code (office use)
Owner Classes within Forest Service Lands (Owner Group 10):		
11	National Forest	11
12	National Grassland	12
13	Other Forest Service	13
Owner Classes within Other Federal Lands (Owner Group 20)		
21	National Park Service	21
22	Bureau of Land Management	22
23	Fish and Wildlife Service	23
24	Departments of Defense/Energy	24
25	Other Federal	25
Owner Classes within State and Local Government lands (Owner Group 30)		
31	State	31
32	Local (County, Municipality, etc.)	32
33	Other Non Federal Public	33

34	*Village or communal property* (Regional)	32
Owner Classes within Private lands (Owner Group 40)		
41	Corporate	41
42	Non Governmental Conservation / Natural Resources Organization - examples: Nature Conservancy, National Trust for Private Lands, Pacific Forest Trust, Boy Scouts of America, etc.	42
43	Unincorporated Partnerships / Associations / Clubs – examples: Hunting Clubs that **own, not lease** property, recreation associations, 4H, etc	43
44	Native American (Indian) – within reservation boundaries	44
45	Individual	45

5.6.5.2 PREVIOUS OWNER CLASS (PFSL/PACIFIC ISLANDS) [PREV_COND_PNWRS.OWNCD]

A downloaded code that best corresponds to the ownership of the land in the condition class at the previous measurement. Note: PREVIOUS OWNER CLASS values have already been updated to current CORE codes.

When collected: SAMPLE KIND = 2 and previous accessible forest land (PREVIOUS CONDITION CLASS STATUS =1) and nonforest land condition classes (PREVIOUS CONDITION STATUS = 2 or 5).
Field width: 2 digits
Tolerance: No errors
Values: See OWNER CLASS

5.6.5.3 PRIVATE OWNER INDUSTRIAL STATUS (CORE 2.5.8) [COND.FORINDCD]

Record the code identifying the status of the owner with regard to being considered industrial as determined by whether or not they own and operate a primary wood processing plant. A primary wood processing plant is any commercial operation which originates the primary processing of wood on a regular and continuing basis. Examples include: pulp or paper mill, sawmill, panel board mill, post or pole mill, etc. Cabinet shops, “mom & pop” home-operated businesses, etc., should not be considered as industrial plants. If any doubt exists with the determination by the field crew about the owner’s industrial status due to name, commercial plant size, type plant, etc., choose code 0. *It has been determined that none of the Pacific Islands landowners are classified as industrial owners so this code should always equal 0.*

NOTE: FIA unit or State headquarters may have to maintain a list of recognized industrial owners within a State for crews to use when making these determinations.

When collected: *Auto-populated as 0 for* all accessible forest land condition classes (CONDITION CLASS STATUS = 1) when the OWNER GROUP is private (OWNER GROUP 40)

Field width: 1 digit
Tolerance: No errors
Values:

0	Land **is not** owned by industrial owner with a wood processing plant
1	Land **is** owned by industrial owner with wood processing plant

5.6.5.4 PREVIOUS PRIVATE OWNER INDUSTRIAL STATUS (PFSL/PACIFIC ISLANDS) [PREV_COND_PNWRS.FORINDCD]

A downloaded code identifying the status of the owner with regard to being considered industrial as determined by whether or not they owned and operated a primary wood processing plant at the previous measurement.

When collected: SAMPLE KIND = 2 and previous accessible forest land condition classes (PREVIOUS CONDITION CLASS STATUS = 1) when the previous OWNER GROUP is private (PREVIOUS OWNER GROUP 40)
Field width: 1 digit
Tolerance: No errors
Values: See PRIVATE OWNER INDUSTRIAL STATUS

5.6.5.5 ARTIFICIAL REGENERATION SPECIES (CORE 2.5.9)
[COND.STDORGSP]

Record the species code of the predominant tree species for which evidence exists of artificial regeneration in the stand. This attribute is ancillary; that is, contrasting condition classes are never delineated based on variation in this attribute.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1) with evidence of artificial regeneration (REGENERATION STATUS = 1)

Field width: 4 digits
Tolerance: No errors
Values: See Appendix 1 (Tree Species Lists)

5.6.5.6 PREVIOUS REGENERATION SPECIES (PFSL/PACIFIC ISLANDS)
[PREV_COND_PNWRS.STDORGSP]

A downloaded species code of the predominant tree species for which evidence existed of artificial regeneration in the stand at the previous measurement (PREVIOUS REGENERATION STATUS = 1).

When collected: SAMPLE KIND = 2 and previous accessible forest land condition classes (PREVIOUS CONDITION CLASS STATUS = 1) with previous evidence of artificial regeneration (PREVIOUS REGENERATION STATUS = 1)
Field width: 3 digits
Tolerance: No errors
Values: See Appendix 1 (Tree Species Lists)

5.6.5.7 STAND AGE (PACIFIC ISLANDS)
[COND.FLDAGE_PNWRS]

Record the average total age, to the nearest year, of the *overstory* trees (plurality of all live trees not overtopped) in the predominant STAND SIZE CLASS of the condition, determined using local procedures. Record 000 for nonstocked stands.

The crew botanist should be able to provide an estimate of stand age given that the trees in the stand originated at approximately the same time. In tropical forests, the continuous process of gap phase dynamics often prevails, where individuals die, form a gap, and are replaced by lower-canopy individuals. Often you cannot determine stand age in stands that are not characterized by stand replacing disturbance. The trees on typhoon-prone islands would be expected to re-initiate growth following disturbance at approximately the same time.

An estimate of STAND AGE is required for every forest land condition class defined on a plot. Stand age is usually highly correlated with stand size and should reflect the average age of all trees that are not overtopped. Unlike the procedure for site tree age (TREE AGE AT DIAMETER),estimates of STAND AGE should estimate the time of tree establishment (i.e., not age at the point of diameter measurement). Note: For planted stands, estimate age based on the year the stand was planted (i.e., do not add in the age of the planting stock).

Developmental stage and known dates of disturbance are likely to be the only guides to estimating stand age.

If continuous tree replacement by gap phase dynamics appears to characterize a stand, record code 996.

Record 997 if you are unable to get a reasonable estimate of stand age and it is not a continuous tree replacement stand.

If a condition class is nonstocked, assign a STAND AGE of 000.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)
Field width: 3 digits
Tolerance: +/- 10%
Values: 000 to 995 (actual stand age estimate), 996 (gap phase dynamics (regional)), 997 (unable to get a reasonable estimate (regional))

5.6.5.8 PREVIOUS STAND AGE (PFSL/PACIFIC ISLANDS) [PREV_COND_PNWRS.FLDAGE_PNWRS]

A downloaded average total age, to the nearest year, of the trees (plurality of all live trees not overtopped) in the predominant STAND SIZE CLASS of the condition at the previous measurement, determined using local procedures. Record 000 for previously nonstocked stands.

When collected: SAMPLE KIND = 2 and previous accessible forest land condition classes (PREVIOUS CONDITION CLASS STATUS = 1).
Field width: 3 digits
Tolerance: +/- 10 percent
Values: See STAND AGE

5.6.5.9 PHYSIOGRAPHIC CLASS (CORE 2.5.23) [COND.PYSCLCD]

Record the code that best describes the PHYSIOGRAPHIC CLASS of the condition within the plot area; land form, topographic position, and soil generally determine physiographic class.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1) or accessible nonforest condition classes when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and CONDITION CLASS STATUS = 2 and NONFOREST CONDITION CLASS STATUS = 2)

Field width: 2 digits
Tolerance: No errors
Values:

Xeric Sites that are normally low or deficient in moisture available to support vigorous tree growth. These areas may receive adequate precipitation, but experience a rapid loss of available moisture due to runoff, percolation, evaporation, etc.

11 Dry Tops - Ridge tops with thin rock outcrops and considerable exposure to sun and wind.

12 Dry Slopes - Slopes with thin rock outcrops and considerable exposure to sun and wind. Includes most steep slopes with a southern or western exposure.

13 Deep Sands - Sites with a deep, sandy surface subject to rapid loss of moisture following precipitation. Typical examples include sand hills, sites along the beach and shores of lakes and streams, and many deserts.

19 Other Xeric - All dry physiographic sites not already described.

Mesic Sites that have moderate but adequate moisture available to support vigorous tree growth except for periods of extended drought. These sites may be subjected to occasional flooding during periods of heavy or extended precipitation.

21 Flatwoods - Flat or fairly level sites outside flood plains. Excludes deep sands and wet, swampy sites.

22 Rolling Uplands - Hills and gently rolling, undulating terrain and associated small streams. Excludes deep sands, all hydric sites, and streams with associated flood plains.

23 Moist Slopes and Coves - Moist slopes and coves with relatively deep, fertile soils. Often these sites have a northern or eastern exposure and are partially shielded from wind and sun. Includes moist mountain tops and saddles.

24 Narrow Flood plains/Bottomlands - Flood plains and bottomlands less than 1/4-mile in width along rivers and streams. These sites are normally well drained but are subjected to occasional flooding during periods of heavy or extended precipitation. Includes associated levees, benches, and terraces within a 1/4 mile limit. Excludes swamps, sloughs, and bogs.

25 Broad Flood plains/Bottomlands - Flood plains and bottomlands 1/4 mile or wider in width along rivers and streams. These sites are normally well drained but are subjected to occasional flooding during periods of heavy or extended precipitation. Includes associated levees, benches, and terraces. Excludes swamps, sloughs, and bogs with year-round water problems.

29 Other Mesic - All moderately moist physiographic sites not already described.

Hydric Sites that generally have a year-round abundance or over-abundance of moisture. Hydric sites are very wet sites where excess water seriously limits both growth and species occurrence.

31 Swamps / Bogs - Low, wet, flat forested areas usually quite extensive that are flooded for long periods of time except during periods of extreme drought. Excludes cypress ponds and small drains.

32 Small Drains - Narrow, stream-like, wet strands of forest land often without a well-defined stream channel. These areas are poorly drained or flooded throughout most of the year and drain the adjacent higher ground.

33 Bays and wet pocosins - Low, wet, boggy sites characterized by peaty or organic soils. May be somewhat dry during periods of extended drought. Examples include the Carolina bays in the southeast US.

34 Beaver ponds

35 Cypress ponds

39 Other hydric - All other hydric physiographic sites.

5.6.5.10 PREVIOUS PHYSIOGRAPHIC CLASS (PFSL/PACIFIC ISLANDS) [PREV_COND_PNWRS.PHYSCLCD]

A downloaded code that best describes the PHYSIOGRAPHIC CLASS of the condition at the previous measurement; land form, topographic position and soil generally determine physiographic class.

When collected: SAMPLE KIND = 2 and previous accessible forest land condition classes (PREVIOUS CONDITION CLASS STATUS = 1) or previous accessible nonforest condition classes when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and PREVIOUS CONDITION CLASS STATUS = 2 and NONFOREST CONDITION CLASS STATUS = 2).
Field width: 2 digits
Tolerance: No errors
Values: See PHYSIOGRAPHIC CLASS (CORE 2.5.23)

5.6.5.11 DOMINANT TREE SPECIES 1 (PACIFIC ISLANDS) [COND.DOMINANT_SPECIES1_PNWRS]

Record the code corresponding to the TREE SPECIES (Appendix 1) with the plurality of cover for all live trees in the condition class that are not overtopped.
For example, if a forested condition class contains 30% species A, 30% species B, and 40 % species C, then the DOMINANT TREE SPECIES will be the code for species C.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)
Field width: 4 digits
Tolerance: no errors
Values: See Appendix 1 (Tree Species Lists)

5.6.5.12 PREVIOUS DOMINANT TREE SPECIES 1 (PACIFIC ISLANDS) [PREV_COND_PNWRS.DOMINANT_SPECIES1_PNWRS]

On remeasurement plots this item will be populated directly from previous visit. The downloaded code for the tree species with the plurality of coverfor all live trees in the condition class that are not overtopped.condition class.

When collected: SAMPLE KIND = 2 and previous accessible forest land condition classes (PREVIOUS CONDITION CLASS STATUS = 1)
Field width: 4 digits
Tolerance: no errors
Values: See Appendix 1 (Tree Species Lists)

5.6.5.13 DOMINANT TREE SPECIES 2 (PACIFIC ISLANDS) [COND.DOMINANT_SPECIES2_PNWRS]

Record the code for the second most abundant tree species in each condition class.
See Dominant Tree Species 1 for coding instructions. If a second species does not exist, record 0000.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)

Field width: 4 digits
Tolerance: no errors
Values: See Appendix 1 (Tree Species List), 0000 (no second tree species present)

5.6.5.14 PREVIOUS DOMINANT TREE SPECIES 2 (PACIFIC ISLANDS)
[PREV_COND_PNWRS.DOMINANT_SPECIES2_PNWRS]

On remeasurement plots this item will be populated directly from previous visit. The downloaded code for the tree species with the plurality of coverfor all live trees in the condition class that are not overtopped.

When collected: SAMPLE KIND = 2 and previous accessible forest land condition classes (PREVIOUS CONDITION CLASS STATUS = 1).
Field width: 4 digits
Tolerance: no errors
Values: See Appendix 1 (Tree Species Lists)

5.6.5.15 DOMINANT TREE SPECIES 3 (PACIFIC ISLANDS)
[COND.DOMINANT_SPECIES3_PNWRS]

Record the code for the third most abundant tree species in each condition class
See Dominant Tree Species 1 for coding instructions. If a third species does not exist, record 0000.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)
Field width: 4 digits
Tolerance: no errors
Values: See Appendix 1 (Tree Species List), 0000 (no third species present)

5.6.5.16 PREVIOUS DOMINANT TREE SPECIES 3 (PACIFIC ISLANDS)
[PREV_COND_PNWRS.DOMINANT_SPECIES3_PNWRS]

On remeasurement plots this item will be populated directly from previous visit. The downloaded code for the tree species with the plurality of cover for all live trees in the condition class that are not overtopped.

When collected: SAMPLE KIND = 2 and previously accessible forest land condition classes (PREVIOUS CONDITION CLASS STATUS = 1).
Field width: 4 digits
Tolerance: no errors
Values: See Appendix 1 (Tree Species Lists)

5.6.5.17 DISTURBANCE 1 (CORE 2.5.11)
[COND.DSTRBCD1_PNWRS]

Record the code corresponding to the presence of the following disturbances. Disturbance can connote positive or negative effects. The area affected by any natural or human-caused disturbance must be at least 1.0 acre in size. Record up to three different disturbances per condition class from most important to least important. This attribute is ancillary; that is, contrasting conditions are never delineated based on variation in this attribute.

<u>For initial plot establishment (SAMPLE KIND =1 or 3), the disturbance must be within the last 5 years. For remeasured plots *(SAMPLE KIND = 2)* recognize only those disturbances that have occurred since the previous inventory.</u>

<u>Disturbance codes require "significant threshold" damage, which implies mortality and/or damage to 25 percent of all trees in a stand or 50 percent of an individual species' count. Additionally, some disturbances affect land and/or vegetation, but initially may not affect vegetation growth or health (e.g., grazing, browsing, flooding, etc.). In these cases, a disturbance should be coded when at least 25 percent of the soil surface or understory vegetation has been affected.</u>

Use the general disturbance codes (i.e. 10, 20, etc.) only if one of the more specific codes (i.e., 41, 42, etc.) does not apply. When coding fire (30) it is important to distinguish ground fire (31) from crown fire (32) where possible. Code "00" if no DISTURBANCE 1 is observed.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1) or accessible nonforest condition classes when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and CONDITION CLASS STATUS = 2 and NONFOREST CONDITION CLASS STATUS = 2)
Field width: 2 digits
Tolerance: No errors
Values:

Code	Definition	Core Code (office use)
00	None - no observable disturbance	00
10	**Insect damage**	**10**
11	insect damage to understory vegetation	
12	insect damage to trees, including seedlings and saplings	
20	**Disease damage**	**20**
21	disease damage to understory vegetation	21
22	disease damage to trees, including seedlings and saplings	22
30	**Fire (from crown and ground fire, either prescribed or natural)**	**30**
31	ground fire	31
32	crown fire	32
40	**Animal damage**	**40**
41	beaver (includes flooding caused by beaver)	41
42	porcupine	42
43	deer/ungulate	43
44	bear	44
45	rabbit	45
46	domestic animal/livestock (includes grazing)	46
47	pigs, wild boars	*40*
50	**Weather damage**	**50**
51	ice	51
52	wind (includes typhoon, hurricane, tornado)	52
53	flooding (weather induced)	53
54	drought	54
56	erosion	*50*
60	**Vegetation (suppression, competition, vines)**	**60**
70	**Unknown / not sure / other (include in NOTES)**	**70**
80	**Human-caused damage** – any significant threshold of human-caused damage not described in the DISTURBANCE codes listed above or in the TREATMENT codes listed below. Must include a plot-level note to describe further.	**80**
90	**Geologic disturbances**	**90**
91	landslide	91

92	avalanche track	92
93	volcanic blast zone	93
94	other geologic event	94
95	earth movement/avalanches	95
96	tsunami	*90*

5.6.5.18 PREVIOUS DISTURBANCE 1 (PACIFIC ISLANDS) [PREV_COND_PNWRS.DSTRBCD1_PNWRS]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous disturbance can be added for the new condition.

Note: some of the 2001 codes were less specific. Do not substitute more specific codes. PREVIOUS DISTURBANCE values have already been updated the current codes (i.e., erosion).

When collected: SAMPLE KIND = 2 and previously accessible forest land condition classes (PREVIOUS CONDITION CLASS STATUS = 1) or previously accessible nonforest condition classes when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and PREVIOUS CONDITION CLASS STATUS = 2 and NONFOREST CONDITION CLASS STATUS = 2)

Field width: 2 digits

Tolerance: No errors

Values:

Code	Definition	Core Code (office use)
00	None - no observable disturbance	00
10	**Insect damage**	**10**
20	**Disease damage**	**20**
30	**Fire (from crown and ground fire, either prescribed or natural)**	**30**
31	ground fire	31
32	crown fire	32
40	**Animal damage**	**40**
41	beaver (includes flooding caused by beaver)	41
42	porcupine	42
43	deer/ungulate	43
44	bear	44
45	rabbit	45
46	domestic animal/livestock (includes grazing)	46
47	pigs, wild boars	*40*
50	**Weather damage**	**50**
51	ice	51
52	wind (includes typhoon, hurricane, tornado)	52
53	flooding (weather induced)	53
54	drought	54
56	erosion	*50*
60	**Vegetation (suppression, competition, vines)**	**60**
70	**Unknown / not sure / other (include in NOTES)**	**70**
80	**Human-caused damage** – any significant threshold of human-caused damage not described in the DISTURBANCE codes listed above or in the TREATMENT codes listed below.	**80**

5.6.5.19 DISTURBANCE YEAR 1 (CORE 2.5.12) [COND.DSTRBYR1]

Record the year in which DISTURBANCE 1 occurred. If the disturbance occurs continuously over a period of time, record 9999.

When collected: When DISTURBANCE 1 > 00
Field width: 4 digits
Tolerance: +/- 1 year for measurement cycles of 5 years
+/- 2 years for measurement cycles of > 5 years
Values: Year that is the same as or since the previous inventory plot visit, or with the past 5 years for plots visited for the first time; 9999

5.6.5.20 PREVIOUS DISTURBANCE YEAR 1 (PFSL/PACIFIC ISLANDS)

[PREV_COND_PNWRS.DSTRBYR1]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous disturbance year can be added for the new condition. If added, record the year in which PREVIOUS DISTURBANCE 1 occurred at the previous measurement. If the disturbance occurs continuously over a period of time, record 9999.

When collected: SAMPLE KIND = 2 and PREVIOUS DISTURBANCE 1 > 00Field width: 4 digits
Tolerance: No errors
Values: ≤ 2000, 9999

5.6.5.21 DISTURBANCE 2 (CORE 2.5.13)

[COND.DSTRBCD2_PNWRS]

Record the second disturbance here. See DISTURBANCE 1 for coding instructions. Code “00” if no DISTURBANCE 2 is observed and DISTURBANCE 1 is greater than “00”.

5.6.5.22 PREVIOUS DISTURBANCE 2 (PACIFIC ISLANDS)

[PREV_COND_PNWRS.DSTRBCD2_PNWRS]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous disturbance can be added for the new condition. See PREVIOUS DISTURBANCE 1 for coding instructions.

5.6.5.23 DISTURBANCE YEAR 2 (CORE 2.5.14)

[COND.DSTRBYR2]

Record the year in which DISTURBANCE 2 occurred. See DISTURBANCE YEAR 1 for coding instructions.

5.6.5.24 PREVIOUS DISTURBANCE YEAR 2 (PFSL/PACIFIC ISLANDS)

[PREV_COND_PNWRS.DSTRBYR2]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous disturbance year can be added for the new condition. See PREVIOUS DISTURBANCE YEAR 1 for coding instructions.

5.6.5.25 DISTURBANCE 3 (CORE 2.5.15)

[COND.DSTRBCD3_PNWRS]

If a stand has experienced more than two disturbances, record the third disturbance here. See DISTURBANCE 1 for coding instructions. Code “00” if no DISTRUBANCE 3 is observed.

5.6.5.26 PREVIOUS DISTURBANCE 3 (PACIFIC ISLANDS)
[PREV_COND_PNWRS.DSTRBCD3_PNWRS]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous disturbance can be added for the new condition. See PREVIOUS DISTURBANCE 1 for coding instructions.

5.6.5.27 DISTURBANCE YEAR 3 (CORE 2.5.16)
[COND.DSTRBYR3]

Record the year in which DISTURBANCE 3 occurred. See DISTURBANCE YEAR 1 for coding instructions.

5.6.5.28 PREVIOUS DISTURBANCE YEAR 3 (PFSL/PACIFIC ISLANDS)
[PREV_COND_PNWRS.DSTRBYR3]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous disturbance year can be added for the new condition. See PREVIOUS DISTURBANCE YEAR 1 for coding instructions.

5.6.5.29 TREATMENT 1 (CORE 2.5.17)
[COND.TRTCD1]

Forestry treatments are a form of disturbance. These human *caused* disturbances are recorded separately here for ease of coding and analysis. The term treatment further implies that a silvicultural application has been prescribed. This does not include occasional stumps of unknown origin or sparse removals for firewood, Christmas trees, or other miscellaneous purposes. The area affected by any treatment must be at least 1.0 acre in size Record up to three different treatments per condition class from most important to least important as best as can be determined. This attribute is ancillary; that is, contrasting conditions are never delineated based on variation in this attribute.

For initial plot establishment (SAMPLE KIND = 1 or 3), the treatment must be within the last *five* years. For remeasured plots (SAMPLE KIND = 2) recognize only those treatments that have occurred since the previous inventory.

Code “00” if no TREATMENT 1 is observed.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1) or accessible nonforest condition classes when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and CONDITION CLASS STATUS = 2 and NONFOREST CONDITION CLASS STATUS = 2)
Field width: 2 digits
Tolerance: No errors
Values:

Code	Definition
00	None - No observable treatment.

10 Cutting - The removal of one or more trees from a stand.

20 Site preparation - Clearing, slash burning, chopping, disking, bedding, or other practices clearly intended to prepare a site for either natural or artificial regeneration.

30 Artificial regeneration - Following a disturbance or treatment (usually cutting), a new stand where at least 50% of the live trees present resulted from planting or direct seeding.

40 Natural regeneration - Following a disturbance or treatment (usually cutting), a new stand where at least 50% of the live trees present (of any size) were established through the growth of existing trees and/or natural seeding or sprouting.

50 Other silvicultural treatment - The use of fertilizers, herbicides, girdling, pruning, or other activities (not covered by codes 10-40) designed to improve the commercial value of the residual stand, or chaining, which is a practice used on woodlands to encourage wildlife forage

5.6.5.30 PREVIOUS TREATMENT 1 (PACIFIC ISLANDS)
[PREV_COND_PNWRS.TRTCD1]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous treatment can be added for the new condition. If added, record the code corresponding to the presence of a treatment since the last periodic inventory or within the 5 years prior to the first annual inventory.

When collected: SAMPLE KIND = 2 and previous accessible forest land condition classes (PREVIOUS CONDITION CLASS STATUS = 1) or previous accessible nonforest condition classes when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and PREVIOUS CONDITION CLASS STATUS = 2 and NONFOREST CONDITION CLASS STATUS = 2)
Field width: 2 digits
Tolerance: No errors
Values: see TREATMENT 1

5.6.5.31 TREATMENT YEAR 1 (CORE 2.5.18)
[COND.TRTYR1]

<u>Record the year in which TREATMENT 1 occurred.</u>

When collected: When TREATMENT 1 > 00
Field width: 4 digits
Tolerance: +/- 1 year for measurement cycles of 5 years
+/- 2 years for measurement cycles of > 5 years
Values: Year that is the same or since the previous inventory plot visit, or within the past five years for plots visited for the first time

5.6.5.32 PREVIOUS TREATMENT YEAR 1 (PACIFIC ISLANDS)
[PREV_COND_PNWRS.TRTYR1]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous treatment year can be added for the new condition. If added, record the year in which PREVIOUS TREATMENT 1 occurred.

When collected: SAMPLE KIND = 2 and PREVIOUS TREATMENT 1 > 00
Field width: 4 digits

Tolerance: No errors
Values: Since the last periodic or within the 5 years prior to the first annual inventory

5.6.5.33 TREATMENT 2 (CORE 2.5.19)

[COND.TRTCD2]

If a stand has experienced more than one treatment, record the second treatment here. See TREATMENT 1 for coding instructions. Code “00” if no *TREATMENT 2 is observed and TREATMENT 1 is greater than “00”.*

5.6.5.34 PREVIOUS TREATMENT 2 (PACIFIC ISLANDS)

[PREV_COND_PNWRS.TRTCD2]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous treatment can be added for the new condition. If added, record the code corresponding to the presence of a treatment since the last periodic inventory or within the 5 years prior to the first annual inventory.

See PREVIOUS TREATMENT 1 for coding instructions, code 00 if none.

5.6.5.35 TREATMENT YEAR 2 (CORE 2.5.20

[COND.TRTYR2]

Record the year in which TREATMENT 2 occurred. See TREATMENT YEAR 1 for coding instructions.

5.6.5.36 PREVIOUS TREATMENT YEAR 2 (PACIFIC ISLANDS)

[PREV_COND_PNWRS.TRTYR2]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous treatment year can be added for the new condition. If added, record the year in which PREVIOUS TREATMENT 2 occurred.

5.6.5.37 TREATMENT 3 (CORE 2.5.21)

[COND.TRTCD3]

If a stand has experienced more than two treatments, record the third treatment here. See TREATMENT 1 for coding instructions. Code “00” if no TREATMENT 3 is observed *and TREATMENT 2 is greater than”00”.*

5.6.5.38 PREVIOUS TREATMENT 3 (PACIFIC ISLANDS)

[PREV_COND_PNWRS.TRTCD3]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous treatment can be added for the new condition. If added, record the code corresponding to the presence of a treatment since the last periodic inventory or within the 5 years prior to the first annual inventory.

See PREVIOUS TREATMENT 1 for coding instructions, code 00 if none.

5.6.5.39 TREATMENT YEAR 3 (CORE 2.5.22)
[COND.TRTYR3]

Record the year in which TREATMENT 3 occurred. See TREATMENT YEAR 1 for coding instructions.

5.6.5.40 PREVIOUS TREATMENT YEAR 3 (PACIFIC ISLANDS)
[PREV_COND_PNWRS.TRTYR3]

A downloaded value that cannot be updated by the current crew. However, if a new condition class is added (i.e., previous condition or mapping error is corrected), a previous treatment year can be added for the new condition. If added, record the year in which PREVIOUS TREATMENT 3 occurred.

5.6.6 DETERMINING CONDITION CLASSES ON NONFOREST LAND

Nonforest land (CONDITION CLASS STATUS = 2) may be subdivided into condition classes that are based on differences in nonforest land uses. See section 5.2.2, NONFOREST LAND, for information on plots that are entirely nonforest.

5.6.6.1 PRESENT NONFOREST LAND USE (CORE 2.5.24)
[COND.PRESNFCD_PNWRS]

Record this attribute for all nonforest condition classes. If a subplot has an accessible forest land or measurable nonforest land condition class present within the 24.0-foot radius, map each nonforest land condition class present. Do not combine nonforest condition classes. Use normal procedures to map and measure other condition classes (i.e., Census water, noncensus water, and nonsampled conditions, CONDITION STATUS = 3, 4, OR 5).

> Example: If accessible forest land, nonforest urban land, and nonforest cropland are all present within a **24.0-foot** fixed-radius plot, map the forest land condition and map each nonforest land use as a separate condition class (size and width requirements for condition class delineation must be met, or one of five exceptions to the delineation rules must apply).

If there is no accessible forest land or measurable nonforest land condition class present within a subplot's 24.0-foot radius, then the only nonforest condition class delineated will be the one present at the subplot center ignoring any other nonforest condition classes that may be present. Use normal procedures to map and measure other condition classes (i.e., Census water, noncensus water, and nonsampled conditions, CONDITION STATUS = 3, 4, or 5).

> Example: If nonforest urban land and nonforest cropland make up the entirety of a 24.0-foot fixed-radius subplot, record only the condition class which occupies the subplot center.

Note: Gradations of agroforestry will be present on the islands and will be coded with code 18.

The following paragraph does NOT pertain to the Hawaiian Islands, but rather to the other Pacific Islands Inventories:

On all visited plots with an accessible forest land and grass, forb or shrub land condition classes, map all nonforest condition classes present on the 4-subplot standard layout. Example: if nonforest – urban land and nonforest – cropland are both present within a 24 feet radius subplot, map each land class as a separate condition class.

When collected: All nonforest conditions (CONDITION CLASS STATUS = 2)
Field width: 2 digits
Tolerance: No errors
Values:

Code	Description	Core Code (office use)
10	Agricultural land - Land managed for crops, pasture, or other agricultural use. The area must be at least 1.0 acre in size and 120.0 feet wide (with the exception of windbreak/shelterbelt, which has no minimum width.) Use the 10 code only for cases not better described by one of the following:	10
11	Cropland	11
12	Pasture	12
13	Idle farmland	13
14	Orchard	14
15	Christmas tree plantation	15
16	Maintained wildlife opening	16
17	Windbreak/Shelterbelt	17
18	Low density agro-forest (agro-forest with less than 10 percent cover of tree species)	*10*
20	Rangeland - Land primarily composed of grasses, forbs, or shrubs. This includes lands vegetated naturally or artificially to provide a plant cover managed like native vegetation and does not meet the definition of pasture. The area must be at least 1.0 ac in size and 120.0 feet wide.	20
21	Grass lands – dominant vegetation is grasses, including *Miscanthus floridulus,Pennisetum polystachion, Saccharum spontaneum, Sporobolus diander, Eragrostis spp., Digitaria spp, and Cenchrus echinatus*	*20*
22	Montane grassland/savannah – found on mountains that reach above the heavy cloud belt. Mostly grassland mixed with xerophytic shrubs and small trees	*20*
23	Montane bogs - sedges, grasses and reeds growing at elevations where they are covered with clouds or fog most of the time. These bogs are on gently sloping or level areas with impeded drainage.	*20*
24	Alpine vegetation – dwarfed vegetation of grasses and cushion-plants growing at high altitudes	*20*
25	Fernland – dense tangles of *Dicranopteris* growing on steep slopes usually below 600 m (1,900 feet)	*20*
26	Subxerophytic/sclerophyllous scrub – vegetation found on truly dry, rain-shadow, leeward mountain slopes and lowlands, consisting of primarily shrub species	*20*
30	Developed - Land used primarily by humans for purposes other than forestry or agriculture. Use the 30 code only for land not better described by one of the following:	30
31	Cultural: business (industrial/commercial), residential, and other places of intense human activity.	31
32	Rights-of-way: improved roads, railway, power lines, maintained canal	32
33	Recreation: parks, skiing, golf courses	33
34	Mining	34
40	Other - Land parcels greater than 1.0 acre in size and greater than 120.0 feet wide, which do not fall into one of the uses described above. Examples include undeveloped beaches, barren land (rock, sand), marshes, bogs, ice, and snow. Use the 40 code only for cases not better described by one of the following.	40
41	Naturally nonvegetated: Barren rock, sand, lava, glaciers	41

42	Wetland	42
43	Beach	43
45	Nonforest Chaparral	45

5.6.6.2 PREVIOUS NONFOREST LAND USE (PFSL/PACIFIC ISLANDS) [PREV_COND_PNWRS.PRESNFCD_PNWRS]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the PREVIOUS NONFOREST LAND USE for all nonforest conditions (Condition Status 2). Use the codes and classifications listed in NONFOREST LAND USE. There are five new NONFOREST LAND USE codes that would not have been in the previous inventories and some that have changed. PREVIOUS NONFOREST LAND USE values have already been updated the current codes (i.e., agro-forest, not sampled). Do not update previous information with these new codes (16, 17, 34, 42, 43 and 45) since they were added to the field manual in 2010 and 2011.

When collected: SAMPLE KIND = 2 and previous nonforest conditions (PREVIOUS CONDITION CLASS STATUS = 2)
Field width: 2 digits
Tolerance: No errors
Values: See NONFOREST LAND USE, excluding codes 16, 17, 34, 42, 43, 45

5.6.7 DETERMINING CANOPY COVER

This section describes the procedures and data items needed to populate the condition-level canopy cover variables (Section 5.6.7.1, LIVE CANOPY COVER, Section 5.6.7.2, LIVE PLUS MISSING CANOPY COVER, and Section 5.6.7.4, TOTAL STEMS). The procedures should be used whenever LIVE PLUS MISSING CANOPY COVER is not obviously less than 5 percent or not obviously greater than 10 percent.

*Note: The MIDAS program has a function to help compute the percent cover. From the CONDITION screen press CTRL+C to access the Crown Cover Calculator. Enter the dimensions of the crown of each tree or group of trees: Diam 1 – long diameter; Diam 2 – perpendicular to long diameter; count of trees with these dimensions; and L (live) or M (missing). Then press the Add button. The crown contribution will be computed. Continue until all trees are added or you reach 10 percent LIVE PLUS MISSING CANOPY COVER - which ever comes first.

5.6.7.1 CANOPY COVER SAMPLE METHOD (CORE 2.5.25) [CANOPY_CVR_SAMPLE_METHOD_CODE]

Record the CANOPY COVER SAMPLE METHOD used to determine LIVE CANOPY COVER, LIVE PLUS MISSING CANOPY COVER, and TOTAL STEMS for the condition. If the ocular method is not used, the appropriate plot-based method should be selected according to the condition's dimensions and shape.

Ocular method - The Ocular method is only used in areas that are obviously *less than 5 percent* LIVE PLUS MISSING CANOPY COVER or obviously greater than 10 *percent* LIVE PLUS MISSING CANOPY COVER. In addition to visual inspections of what is on the ground, crews can also use various types of aerial imagery to help determine LIVE CANOPY COVER and LIVE PLUS MISSING CANOPY COVER values using this method. The Ocular method may also be used on condition status 2 plots were access to the nonforest landcover area may be limited or the nonforest condition is a developed non-forest land use. Note that when the Ocular method is used, it is likely to be easier for the observer to ignore subplot boundaries and assess the percentage of tree canopy cover over the condition in question, without regard to the locations of the stems supporting the canopy over the plot.

Acre method - The Acre method is used when the ocular method is not appropriate and when it is safe and practical to sample on the entire acre.

1. To determine if minimum 10% LIVE PLUS MISSING CANOPY COVER is reached (4356 sq ft), the crew samples all live, dead, and missing tree canopies on the one-acre sample plot (117.75 foot radius) as described above in LIVE PLUS MISSING CANOPY COVER.

2. If the 10% LIVE PLUS MISSING CANOPY COVER threshold is met and there is additional LIVE PLUS MISSING CANOPY COVER on the acre plot, crews can estimate the remaining LIVE PLUS MISSING CANOPY COVER using the ocular method.

3. If the 10% LIVE PLUS MISSING CANOPY COVER threshold is not met, a sample of all live seedlings, saplings, and trees that are within the acre plot (117.75 foot) radius is required. If the one-acre plot tree count reaches the sum of 200 stems of any combination of trees, seedlings and saplings, the condition will be sampled as accessible forestland.
   *Note: Only do stem count if the other methods have been exhausted.
.
4. As with the subplot method, the sample acre (117.75 foot radius plot) must fall entirely in the questionable condition. The acre method should be moved if necessary so that it falls within the questionable condition.

Percent Canopy Cover Calculation for Acre method:

If a condition is close to 10% canopy cover, and other methods may not accurately represent tree canopy cover due to irregular spatial distribution of tree canopies (e.g., *clumpiness*), the Acre method provides another estimate of the total tree canopy area within the radius of a 1-acre plot located within the condition in question.

Given:
1. The area of an acre is 43,560 $ft^{2.}$
2. A 1-acre circle has a radius of 117.75 ft.
3. 10% of 1-acre is 4,356 ft^2.

and assuming the canopies to be ellipses:

1. Measure the approximate canopy diameter (long axis and short axis) for each tree on the acre.
2. Calculate the canopy area for each tree as Canopy Area = pi*long axis d/2*short axis d/2).
3. Add up the Canopy Areas, and divide by 435.6 (1% of an acre) to obtain percent cover (truncate)

Transition zones and forest/nonforest encroachment – When an accessible forest land condition encroaches into a nonforest condition, the border between forest and nonforest is often a gradual change in tree cover or stocking with no clear and abrupt boundary. This may cause difficulties determining exactly where the forested area meets the minimum canopy cover or stem count criteria. For these cases, determine where the land clearly meets the minimum requirements, and where it clearly is less than required. Divide the zone between these points in half, and determine the side of the zone on which the subplot center is located. Classify the condition class of the subplot based on this line.

If the Acre plot falls on or very near a transition, the Acre plot should be moved into the condition identified at plot center (Figure 5.15).

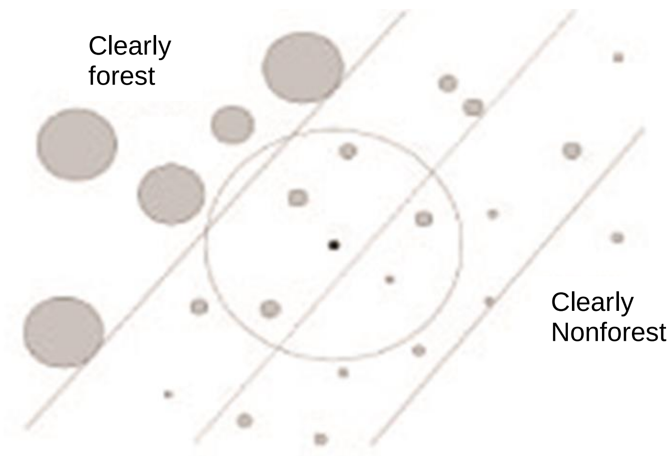


Figure 5.15. Example of classifying the condition class of the subplot in a transition zone with forest/Nonforest encroachment.

For example, at measurement time 1, a clear and distinct boundary existed between the forest and nonforest condition classes. At time 2, however, there now exists a zone of regeneration or small diameter trees between the previous forest condition and where the nonforest clearly remains. If the zone of encroachment meets cover / stem count criteria where it meets the nonforest, classify the entire zone as forest. If the zone is clearly nonforest up to the original stand, call it all nonforest. If the encroachment or transition zone does not clearly meet cover / stem count criteria where it meets the nonforest, determine where the land clearly meets the minimum requirements, and where it clearly is less than required. Divide the zone between these points in half, and classify the entire subplot based on which side of the line the subplot center falls.

Subplot method - The Subplot method is used when the ocular method is not appropriate and in cases where the terrain, vegetation, and dimensions of a condition or the size of the field crew DO NOT allow a safe or practical sample using the acre method.

1. To estimate cover using the subplot method, the crew measures the crowns of all live trees, seedlings, and saplings on each of the four 1/24 acre subplots. To estimate total stems per

acre, stems >5.0 inches diameter are counted on the subplots and stems <5.0 inches diameter are counted only on the four 1/300 acre microplots located 90 degrees and 12.0 feet from the subplot centers. The sample may consist of any combination of regular subplots and/or phantom subplots, provided all subplots fall entirely in the questionable condition.
*Note: It is best to estimate total stems per acre, all stems should be counted for all of the subplots (seedlings, saplings, trees), and multiplied by 6 to see if it meets 200.

2. Install phantom subplots as necessary to yield four 1/24-acre sample areas that fall entirely within the questionable condition. Record the location of these phantom or temporary subplots on your four point plot sketch and monument. Establish phantom plots using the following protocol (Figure 5.16):

    a. Begin by locating the phantom subplots using the "highest" numbered regular subplot that falls in the questionable condition (e.g., 4 is the highest numbered regular subplot, next 3 and then 2). The phantom subplots are located in the following fashion: 1) 120.0 feet at 360 degrees, 2) 120.0 feet at 120 degrees, then 3) 120.0 feet at 240 degrees.
    b. If this fails to yield 4 subplots that fall entirely within the questionable condition, install the remaining phantom subplots off the next highest numbered regular subplot that falls in the questionable condition.
    c. If this fails to produce a suitable location, rotate the phantom subplot off the other phantom subplots in the attempted order of installation until 4 subplots have been located in the questionable condition.

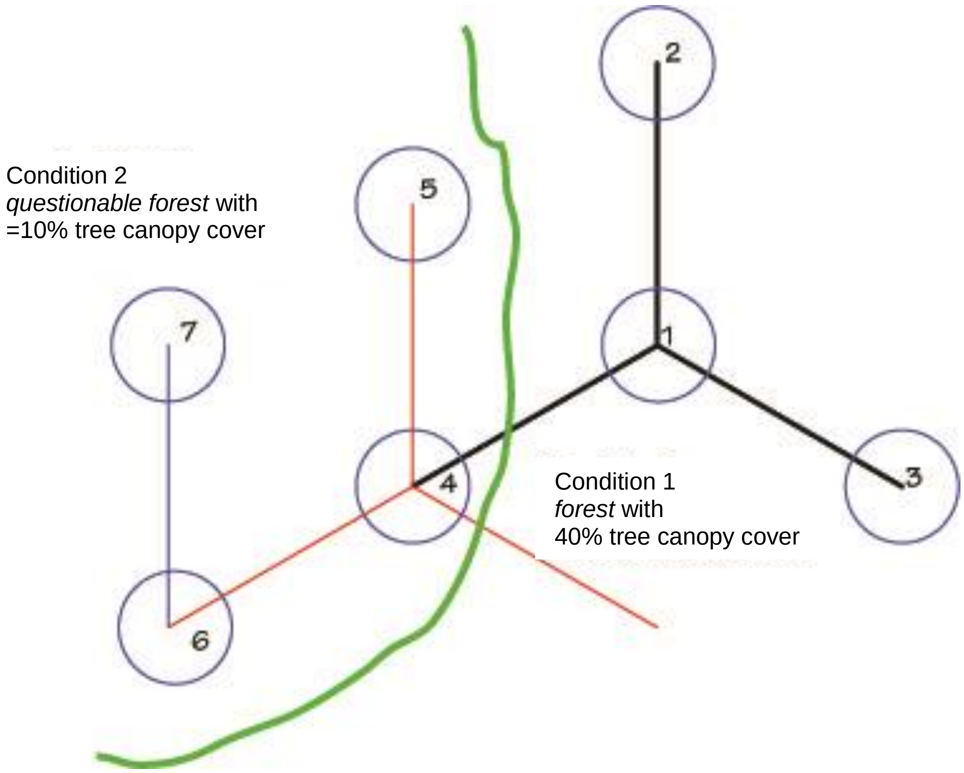


Figure 5.16: Example of the subplot method phantom subplots.

3. The Subplot method uses a 1/6-acre sample, so it would require a total of 726 ft^2 of LIVE PLUS MISSING CANOPY COVER to reach 10% threshold and be sampled as accessible forestland. If the sample of the subplot method does not reach the 10% threshold for LIVE PLUS MISSING CANOPY COVER, the stem counts are used to determine if there are 200 live stems per acre. Stem counts on the subplot and micro plot have to meet the following tally combinations to be sampled as accessible forestland (assuming 4 subplots and microplots are used):

Microplot Count (<5.0 inch DIA)	Subplot Count ($\geq$5.0 inch DIA)	Estimated Stems per Acre
3	0	225
2	9	204
1	21	201
0	34	204

*Note: If subplot method does not yield 10% cover, then use stem count for all stems on all subplots.

Sub-acre method - The Sub-Acre method is *only* used when the ocular method is not appropriate and *only* when the acre or subplot methods can not be established due to the condition's shape, dimensions or accessibility.

1. <u>Ensure that the canopy cover sample area is representative of the condition in question.</u>

2. <u>Determine if minimum 10% LIVE PLUS MISSING CANOPY COVER is reached. The crew samples all live, dead, and missing tree canopies on the canopy cover sample plot as described above in LIVE PLUS MISSING CANOPY COVER. The 10% threshold is dependent on the sample plot size and respective area in square feet.</u>

3. <u>If the 10% LIVE PLUS MISSING CANOPY COVER threshold is met and there is additional LIVE PLUS MISSING CANOPY COVER on the sub-acre plot, crews can estimate the remaining LIVE PLUS MISSING CANOPY COVER using the ocular method.</u>

4. <u>If the 10% LIVE PLUS MISSING CANOPY COVER threshold is not met, the estimate of all live seedlings, saplings, and trees (stem count x appropriate stem count multiplier) must be 200 or greater for the condition to qualify as accessible forestland.</u>
   *Note: Only do stem count if the other methods have been exhausted.

5. <u>As with the acre and subplot method, the sub-acre sample plot(s) must fall entirely in the questionable condition.</u>

6. <u>Potential circular plot sizes and appropriate scaling factors:</u>

Acre Fraction	Radius (ft)	Area (sq ft)	10% Cover (sq ft)	Stem Count Multiplied
1	117.7	43,560	4356	x1
1/2	83.3	21,780	2178	x2
1/3	67.6	14,520	1452	x3
1/4	58.9	10,890	1089	x4
1/5	52.7	8,712	872	x5
1/6	49.0	7,260	726	x6

When collected: CONDITION CLASS STATUS = 1 or 2
Field width: 1 digit
Tolerance: None
MQO: At least 90% of the time
Values:

<u>1</u>	<u>Ocular method</u>
<u>2</u>	<u>Subplot method</u>
<u>3</u>	<u>Acre method</u>

4 Sub-acre method

5.6.7.2 LIVE CANOPY COVER (CORE 2.5.26) [COND.LIVE_CANOPY_CVR_PCT]

Record the percentage of LIVE CANOPY COVER for the condition. Include live tally trees, saplings, and seedlings that cover the sample area. For conditions where the LIVE CANOPY COVER is low and there is a question whether it meets 10 percent LIVE *PLUS MISSING* CANOPY COVER, the crew will measure every crown width within the canopy cover sample area *and enter the Total Live Canopy Cover percent from the cover calculator (always round down to the nearest percent)*. LIVE CANOPY COVER can be based on an ocular estimate when the condition in question is certain to contain *less than 5 percent or* greater than 10 *percent* LIVE PLUS MISSING CANOPY COVER or TOTAL STEMS greater than 200.

- Do not include the crown portion of trees, saplings, or seedlings that are vertically overtopped by other trees, saplings or seedlings.
- Occasionally, a branch may protrude abnormally, but the lateral crown line is drawn across the portion of the branch which includes the “normal outline” of the tree.
- For leaning trees, ocularly upright the trees and measure crowns as if the trees were upright.

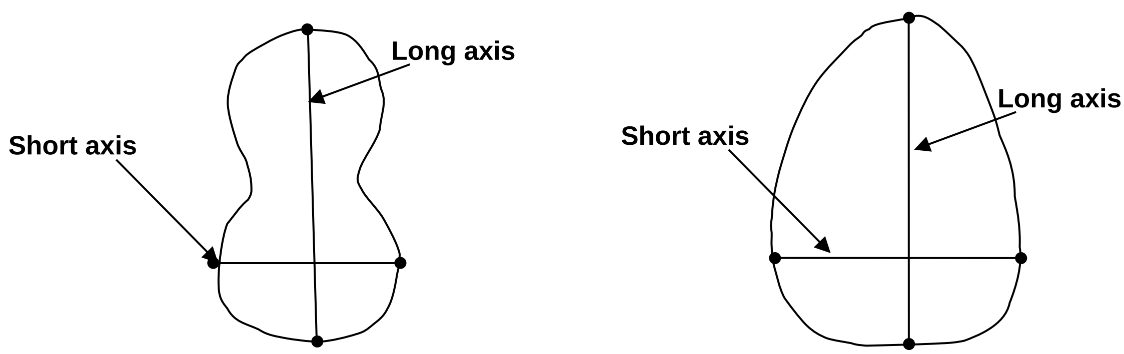


Figure 5.17 Examples of where to measure canopy widths.

LIVE CANOPY COVER can be based on an ocular estimate when the condition in question is certain to contain less than 5 percent or greater than 10% LIVE PLUS MISSING CANOPY COVER or TOTAL STEMS greater than 200.

When collected: All CONDITION CLASS STATUS = 1 or 2
Field width: 2 digits
Tolerance: 0 – 12% - No errors
13 – 20% - 10% error
21 – 100% - 25% error
Values: 00 – 99 (where 99=99 to 100%)

5.6.7.3 LIVE PLUS MISSING CANOPY COVER (CORE 2.5.27)
[COND.LIVE_MISSING_CANOPY_CVR_PCT]

Record the percentage of LIVE PLUS MISSING CANOPY COVER for the condition by adding the LIVE CANOPY COVER plus the estimated missing canopy cover that existed prior to disturbance (harvesting, fire, chaining, etc.). Include live and dead and removed tally trees, saplings, and seedlings. When CANOPY COVER SAMPLE METHOD > 1, enter the Total Live Plus Missing Cover percent from the cover calculator. Otherwise, *base* the estimate on field observations, aerial photos, historical aerial imagery, and similar evidence of undisturbed conditions. The total of the LIVE PLUS MISSING CANOPY COVER cannot exceed 100 *percent*.

When collected: CONDITION CLASS STATUS = 1 or 2
Field width: 2 digits
Tolerance: 0 – 12% - No errors
13 – 20% - 10% error
21 – 100% - 25% error
Values: 00 – 99 (where 99=99 to 100%)

5.6.7.4 TOTAL STEMS (CORE 2.5.28)
[COND.NBR_LIVE_STEMS]]

Record the estimated number of live stems per acre of the condition. Base the estimate on actual stem count of tally tree species within the sample area *if called for by the criteria in* Section 5.6.7.2, LIVE CANOPY COVER (CORE 2.5.26).

When collected: CONDITION CLASS STATUS = 1 OR 2 AND CANOPY COVER SAMPLE METHOD > 1
Field width: 5 digits
Tolerance: 10%
Values: 00000 - 99999

5.7 Nonsampled Condition Class Attributes

Nonsampled land (CONDITION CLASS STATUS = 5) may be subdivided into condition classes that are based on differences on nonsampled reason. See section 5.2.5, NONSAMPLED, for information on plots that are entirely nonsampled.

When encountering an area where CONDITION NONSAMPLED REASON (Section 5.7.1) is constant but attributes differ, record attributes that apply to the greater part of the area within the nonsampled condition class.

Example: subplot center is accessible forest land, but there is a hazardous area delineated on the subplot.

RESERVED STATUS, OWNER GROUP, and estimated FOREST TYPE will be recorded for the nonsampled condition. If there is an ownership boundary between two OWNER GROUPS on plot within the nonsampled area, the difference in OWNER GROUP is ignored and the OWNER GROUP is assigned based on the condition that covers the more area on the subplot.

5.7.1 CONDITION NONSAMPLED REASON (CORE 2.4.3) [COND.COND_NONSAMPLE_REASN_CD]

For portions of plots that cannot be sampled (CONDITION CLASS STATUS = 5), record one of the following reasons.

When collected: When CONDITION CLASS STATUS = 5
Field width: 2 digits
Tolerance: No errors
Values:

01	Outside U.S. boundary – Assign this code to condition classes beyond the U.S. border.
02	Denied access area – Any area within the sampled area of a plot to which access is denied by the legal owner, or to which an owner of the only reasonable route to the plot denies access. There are no minimum area or width requirements for a condition class delineated by denied access. Because a denied-access condition can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available.
03	Hazardous situation – Any area within the sampled area on plot that cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, temporary high water, etc. Although the hazard is not likely to change over time, a hazardous condition remains in the sample and is re-examined at the next occasion to determine if the hazard is still present. There are no minimum size or width requirements for a condition class delineated by a hazardous condition.
10	Other – This code is used whenever a condition class is not sampled due to a reason other than one of the specific reasons listed. A field note is required to describe the situation.

5.7.2 PREVIOUS CONDITION NONSAMPLED REASON (PFSL/PACIFIC ISLANDS) [PREV_COND_PNWRS.COND_NONSAMPLED_REASN_CD]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record one of the following reasons for portions of the plot which could not be sampled at the previous measurement (PREVIOUS CONDITION CLASS STATUS = 5).Note: PREVIOUS CONDITION NONSAMPLED REASON values have already been updated to current codes.

When collected: SAMPLE KIND = 2 and PREVIOUS CONDITION CLASS STATUS = 5
Field width: 2 digits
Tolerance: No errors
Values: see CONDITION NONSAMPLED REASON

5.7.3 ESTIMATED NONSAMPLED LAND COVER TYPE (PNW) [COND.EST_NON_SAMP_LCT_PNWRS]

Record the land cover type best representing the condition class, as determined from the air, ground, or some form of remote sensing. Use your best judgment in estimating which cover type is present. This estimation should be based on the plurality of the cover type present for the entire condition class. When land cover type is inferred using remote sensing, include the type and date of imagery used in the electronic CONDITION CLASS NOTES.

When collected: When CONDITION NONSAMPLED REASON = 2, 3, or 10
Field width: 1 digit
Tolerance: No errors
Values:

Code	Description
1	Forest land
2	Nonforest land
3	Noncensus water
4	Census water

5.7.4 NONSAMPLED FOREST TYPE (PNW) [COND.FLDTYPCD_NON_SAMP_PNWRS]

When the ESTIMATED NONSAMPLED LAND COVER TYPE appears to be forest land, further describe it by determining the forest type.

When collected: When ESTIMATED NONSAMPLE LAND COVER TYPE = 1
Field width: 3 digits
Tolerance: No errors
Values: see FOREST TYPE (Section 5.6.4.9) for codes

5.8 Condition Class Notes

5.8.1 PREVIOUS CONDITION CLASS NOTES (PFSL/PACIFIC ISLANDS [PREV_COND_PNWRS.NOTES]

Record any notes needed to clarify or explain changes to previous condition class data items or condition class mapping. If the current crew corrects any previous crew errors, an explanation describing why values were changed is required. Include what was determined to be wrong and describe, in detail, the reason the current crew knows a previous error was made

When collected: All plots when previous crew incorrectly recorded condition class variables and previous values where changed by current crew
Field width: 2000 characters
Tolerance: N/A
Values: Single words and abbreviated sentences

5.8.2 CONDITION CLASS NOTES (PNW) [COND.NOTES]

Record any notes needed to clarify or explain a special situation in the particular condition class being defined.

When collected: All plots, use when clarification is needed
Field width: 2000 characters
Tolerance: N/A
Values: Single words and abbreviated sentences

6 SUBPLOT DATA

Each subplot is described by a series of area parameters relating to topographic features and existing cover type. These data also relate to the microplot, since the microplot is contained within the subplot perimeter. This information is used for a variety of topics, including: identifying potential limits to management (e.g., topography), and relating physical site features to forest composition and productivity.

6.1 RECORDING SUBPLOT INFORMATION

6.1.1 SUBPLOT NUMBER (CORE 3.1)
[SUBPLOT.SUBP]

Record the code corresponding to the number of the subplot.

When Collected: All subplots
Field width: 1 digit
Tolerance: No errors
Values:

1 Center subplot
2 North subplot
3 Southeast subplot
4 Southwest subplot

6.1.2 SUBPLOT STATUS (CORE 3.2)
[SUBPLOT.SUBP_STATUS_CD]

Indicate whether or not this subplot currently has at least one accessible forest land condition class. In situations where a subplot is denied access or hazardous, but obviously contains no forest land, record SUBPLOT STATUS = 2. In cases where a subplot is access-denied or hazardous land use and has the possibility of forest, record SUBPLOT STATUS = 3.

When collected: All subplots
Field width: 1 digit
Tolerance: No errors
Values:

1 Sampled – at least one accessible forest land condition present on subplot
2 Sampled – no accessible forest land condition present on subplot
3 Nonsampled – possibility of forest land
4 Sampled – QA crew only measured condition, boundary and some subplot level data. For use only on check plots (QA STATUS = 2 - 6). Not a legal entry on production plots (QA STATUS = 1 or 7).

6.1.3 SUBPLOT NONSAMPLED REASON (CORE 3.3)
[SUBPLOT.POINT_NONSAMPLE_REASN_CD]

For entire subplots that cannot be sampled, record one of the following reasons.

When collected: When SUBPLOT STATUS = 3
Field width: 2 digits
Tolerance: No errors
Values:

01 Outside U.S. boundary – Assign this code to condition classes beyond the U.S. border.

02 Denied access area – Any area within the sampled area of a plot to which access is denied by the legal owner, or to which an owner of the only reasonable route to the plot denies access. There are no minimum area or width requirements for a condition class delineated by denied access. Because a denied-access condition can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available.

03 Hazardous situation – Any area within the sampled area on plot that cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, temporary high water, etc. Although the hazard is not likely to change over time, a hazardous condition remains in the sample and is re-examined at the next occasion to determine if the hazard is still present. There are no minimum size or width requirements for a condition class delineated by a hazardous condition

04 Time limitation – This code applies to full subplots that cannot be sampled due to a time restriction. This code is reserved for areas with limited access, and in situations where it is imperative for the crew to leave before the plot can be completed (e.g., scheduled helicopter rendezvous). Use of this code requires notification to the field supervisor. This code should not be used for an entire plot (use code 8 [skipped visit] when an entire plot is skipped; see *Chapter 4, Plot Level Data*).

05 Lost data – The plot data file was discovered to be corrupt after a panel was completed and submitted for processing. This code is assigned to entire plots or full subplots that could not be processed, and is applied at the time of processing after notification to the region. Note: This code is for office use only.

10 Other – This code is used whenever a plot or condition class is not sampled due to a reason other than one of the specific reasons already listed. A SUBPLOT NOTE is required to describe the situation.

6.1.4 NONFOREST SUBPLOT STATUS (CORE 3.4)
[SUBPLOT.NONFOREST_SUBP_STATUS]

Record the code that describes the sampling status of the other-than-forest subplot, i.e., SUBPLOT STATUS = 2. In cases where subplot is denied access or hazardous, but obviously contains no nonforest land, i.e., subplot is either noncensus water or census water, record NONFOREST SUBPLOT STATUS = 2.

When collected: When NONFOREST SAMPLING STATUS = 1 and SUBPLOT STATUS = 2
Field width: 1 digit
Tolerance: no errors
Values:

1 Sampled – at least one accessible nonforest land condition present on the subplot.

2 Sampled – no nonforest land condition present on subplot, i.e., subplot is either census and/or noncensus water.
3 Nonsampled nonforest

6.1.5 NONFOREST SUBPLOT NONSAMPLED REASON (CORE 3.5) [SUBPLOT.NONFOREST_SUBP_NONSAMPLE_REASN]

For entire nonforest subplots that can not be sampled, record one of the following reasons.

When collected: When NONFOREST SAMPLING STATUS = 1 and SUBPLOT STATUS = 2 and NONFOREST SUBPLOT STATUS = 3
Field width: 2 digits
Tolerance: no errors
Values:

02 Denied access – A subplot to which access is denied by the legal owner, or to which an owner of the only reasonable route to the plot denies access. Because a denied-access subplot can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available.

03 Hazardous situation – A subplot that cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, temporary high water, etc. Although the hazard is not likely to change over time, a hazardous condition remains in the sample and is re-examined at the next occasion to determine if the hazard is still present.

04 Time limitation – This code applies to a full subplot that cannot be sampled due to a time restriction. This code is reserved for areas with limited access, and in situations where it is imperative for the crew to leave before the plot can be completed (e.g., scheduled helicopter rendezvous). Use of this code requires notification to the field supervisor.

10 Other – This code is used whenever a subplot is not sampled due to a reason other than one of the specific reasons already listed. A SUBLOT NOTE is required to describe the situation.

6.1.6 PREVIOUS SUBPLOT CENTER CONDITION (PNW) [SUBPLOT.PREV_SUBPCOND_PNWRS]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the CONDITION CLASS NUMBER of the condition class at the subplot center as it existed at the previous measurement.

When collected: SAMPLE KIND = 2
Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

6.1.7 SUBPLOT CENTER CONDITION (CORE 3.6) [SUBPLOT.SUBPCOND]

Record the CONDITION CLASS NUMBER of the condition class at the subplot center.

When collected: All subplots
Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

6.1.8 SUBPLOT CONDITION LIST (CORE 3.11)

[SUBPLOT.CONDLIST]

This is a listing of all condition classes located within the 24.0-foot radius around the subplot center. A maximum of four conditions is permitted at any individual subplot *(a maximum of nine condition classes can be recorded on a plot)*. If a condition class has already been defined at a previously completed subplot, use the same condition class number whenever that condition is encountered. Define new condition classes as they are encountered. If more than one condition class is listed here, boundary data are required. If only one condition class is listed, this condition is automatically assigned to the subplot center and microplot center. If *fewer* than four condition classes occur on this subplot, complete the remainder of this field with zeros. For example, if condition 1 is the only condition class on a subplot, record 1000.

When collected: All plots
Field width: 4 digits
Tolerance: No errors
Values: 1000 to 9876

6.1.9 MICROPLOT CENTER CONDITION (CORE 3.7)

[SUBPLOT.MICROCOND]

Record the CONDITION CLASS NUMBER of the condition class at the microplot center.

When collected: All microplots
Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

6.1.10 PREVIOUS MICROPLOT CENTER CONDITION (PFSL/PACIFIC ISLANDS)

[SUBPLOT.PREV_MICRCOND]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the CONDITION CLASS NUMBER of the condition class at the microplot center as it existed at the previous measurement.

When collected: SAMPLE KIND = 2
Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

6.1.11 SUBPLOT SLOPE (CORE 3.8)

[SUBPLOT.SLOPE]

Record the angle of slope across the subplot to the nearest 1 percent. SUBPLOT SLOPE is determined by sighting the clinometer along a line parallel to the average incline (or decline) of each subplot. This angle is measured along the shortest pathway down slope before the drainage direction changes. To measure SUBPLOT SLOPE, Observer 1 should stand at the uphill edge of the subplot and sight Observer 2, who stands at the downhill edge of the subplot. Sight Observer 2 at the same height as the eye-level of Observer 1. Read the slope directly from the percent scale of the clinometer:

- If slope changes gradually across the subplot, record an average slope.

- If slope changes across the subplot but the slope is predominantly of one direction, code the predominant slope percentage rather than the average.
- If the subplot falls directly on or straddles a canyon bottom or narrow ridge top, code the average slope of the side hill(s).
- If the subplot falls on a canyon bottom or on a narrow ridge top, but most of the area lies on one side hill, code the slope of the side hill where most of the area lies.

When collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT STATUS = 1) or subplots with an accessible nonforest condition class present when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and SUBPLOT STATUS = 2 and NONFOREST SUBPLOT STATUS = 1)

Field width: 3 digits
Tolerance: +/- 10%
Values: 000 to 155

6.1.12 SUBPLOT ASPECT (CORE 3.9)

[SUBPLOT.ASPECT]

Record the aspect across the subplot, to the nearest 1 degree. SUBPLOT ASPECT is determined along the direction of slope for land surfaces with at least 5 percent slope in a generally uniform direction. SUBPLOT ASPECT is measured with a hand compass along the same direction used to determine slope.

- If aspect changes gradually across the subplot, record an average aspect.
- If aspect changes across the subplot but the aspect is predominately of one direction, code the predominate direction rather than the average.
- If the subplot falls on or straddles a canyon bottom or narrow ridge top, code the aspect of the ridge line or canyon bottom.
- If the subplot falls on a canyon bottom or on a narrow ridge top, but most of the area lies on one side hill, code the aspect of the side hill.

When collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT STATUS = 1) or subplots with an accessible nonforest condition class present when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and SUBPLOT STATUS = 2 and NONFOREST SUBPLOT STATUS = 1)

Field width: 3 digits
Tolerance: +/- 10 degrees
Values:

000	no aspect, slope < 5 percent
001	1 degree
002	2 degrees
…	…
...	…
360	360 degrees, due north

6.1.13 SLOPE SHAPE (PACIFIC ISLANDS)

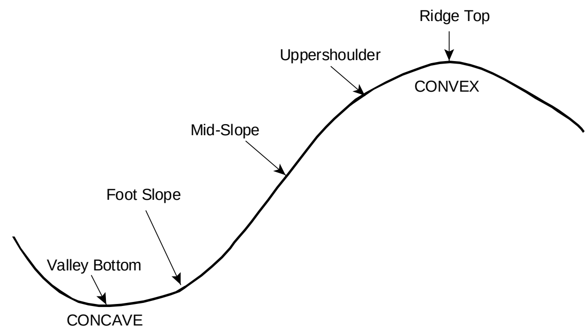
[SUBPLOT.SLOPE_SHAPE_PNWRS]

Record the slope shape over the subplot under consideration:

When collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT STATUS = 1) or subplots with an accessible nonforest condition class present when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and SUBPLOT STATUS = 2 and NONFOREST SUBPLOT STATUS = 1)

Field width: 2 digits
Tolerance: No errors
Values:

Flat	=	00
Concave	=	10
Convex	=	20



6.1.14 SLOPE POSITION (PACIFIC ISLANDS)

[SUBPLOT.SLOPE_POSITION_PNWRS]

Record the slope position over the subplot under consideration.

When collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT STATUS = 1) or subplots with an accessible nonforest condition class present when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and SUBPLOT STATUS = 2 and NONFOREST SUBPLOT STATUS = 1)
Field width: 2 digits
Tolerance: +/- 1 class for codes 10-30
Other codes – no errors
Values:

No Slope	=	00
Uppershoulder	=	10
Midslope	=	20
Footslope	=	30
Valleybottom	=	40
Ridgetop	=	50

To more accurately measure the moisture-related effects of topography on vegetation, two separate, calculated indices will be computed in the lab from data gathered in the field: 1.) an index of moisture demand and 2.) an index of moisture supply. For moisture demand, the aspect, slope and elevation at each plot is used to approximate annual moisture demand from “Potential Solar Beam Irradiation on Slopes” tables or equations (Frank and Lee 1966). Moisture supply is estimated from an additive, modified, topographic relative moisture index (TRMI; Parker 1982) constructed using slope shape, percent slope and slope position. Higher moisture supply values occur on footslopes, gentle slopes and/or sites exhibiting slope concavities.

6.1.15 SNOW/WATER DEPTH (CORE 3.10)

[SUBPLOT.WATERDEP]

Record to the nearest 0.1 feet the average approximate depth of water or snow covering the subplot at the time of data collection. This variable is used to indicate subplots where some variables (e.g., seedling count, total heights) may be measured with less certainty due to conditions at the time of measurement.

This item is intended for water/snow/ice which covers substantial portions of subplots. Record “00” for streams contained within their banks and not affecting any measurements.

> When collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT STATUS = 1) or subplots with an accessible nonforest condition class present when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and SUBPLOT STATUS = 2 and NONFOREST SUBPLOT STATUS = 1)
>
> Field width: 2 digits (x.y)
> Tolerance: +/- 0.5 feet
> Values: 0.0 to 9.9

6.1.16 PREVIOUS SUBPLOT MAPPING ERROR (PFSL/PACIFIC ISLANDS)

[SUBPLOT.PREV_COND_MAP_ERROR_PNWRS]

Record a code to indicate whether or not a previous mapping error exists on a subplot. If PREVIOUS SUBPLOT MAPPING ERROR = Y, a note must be entered in SUBPLOT NOTES explaining why the crew knows an error was made previously.

> When Collected: SAMPLE KIND = 2
> Field width: 1 digit
> Tolerance: No errors
> Values:
> N	No error on subplot
> Y	Error on subplot

6.1.17 SUBPLOT NOTES (PNW)

[SUBPLOT.NOTES]

Record any notes needed to clarify or explain a special situation encountered on the subplot.

> When collected: All plots, as needed
> Field width: 2000 characters
> Tolerance: N/A
> Values: Single words and abbreviated sentences

6.2 Pig Damage

Wild pigs were introduced to the Pacific Islands by humans centuries ago. They were farmed loosely and became wild on the islands. These animals have no non-human predators and have subsequently expanded their populations. These populations have caused a lot of destruction to forests and other vegetated habitats. The following are examples of wild pig damage that may be encountered: rooting (sometimes called grubbing) where pigs dig up the soil and vegetation, compacted trails, wallows in wet soils, and rubbing on trees and shrubs.

Because of this problem crews will be assessing pig damage for each sampled condition on all subplots. Crews will record the percentage of the entire subplot (as viewed from above) that has noticeable pig damage to the ground and ground vegetation for each sampled condition. **It is important that this value is always estimated as a percent of an entire subplot.** Code the following data items as described.

6.2.1 SUBPLOT NUMBER OF PIG DAMAGE (PACIFIC ISLANDS) [SUBP_COND_ROOT_DIS_PNWRS.SUBP]

Record the code corresponding to the number of the subplot

When Collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT STATUS = 1) or subplots with an accessible nonforest condition class present when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and SUBPLOT STATUS = 2 and NONFOREST SUBPLOT STATUS = 1)

Field width: 1 digit
Tolerance: No errors
Values:
1 Center subplot
2 North subplot
3 Southeast subplot
4 Southwest subplot

6.2.2 CONDITION CLASS NUMBER OF PIG DAMAGE (PACIFIC ISLANDS) [SUBP_COND_ROOT_DIS_PNWRS.CONDID]

When Collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT STATUS = 1) or subplots with an accessible nonforest condition class present when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and SUBPLOT STATUS = 2 and NONFOREST SUBPLOT STATUS = 1)

Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

6.2.3 PERCENT OF PIG DAMAGE ON SUBPLOT (PACIFIC ISLANDS) [SUBP_COND_ROOT_DIS_PNWRS.PIG_DAMAGE_PCT]

Record the estimated percentage of area of the subplot covered by pig damage for each sampled condition class found on subplot

When Collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT STATUS = 1) or subplots with an accessible nonforest condition class present when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and SUBPLOT STATUS = 2 and NONFOREST SUBPLOT STATUS = 1)

Field width: 3 digits
Tolerance: +/- 10 percent
Values: 000 to 100

7 BOUNDARY REFERENCES

7.1 GENERAL INSTRUCTIONS

Boundary reference data are used to compute the area for the condition classes sampled on a plot and to remeasure plots. Record all boundaries between condition classes that occur within the sampled (fixed-radius) area on subplots and microplots. Boundaries outside sampled (fixed-radius) areas are not referenced.

In addition to using the recording procedures described herein, sketch maps of condition class boundaries onto the pre-printed plot diagrams on *the plot card, accurately representing the shape of each boundary as it is on the ground (boundary data recorded in the PDR should represent the condition class area, but may not accurately represent the shape)*.

7.2 REFERENCE PROCEDURE

Within the sampled area on each microplot, reference the approximate boundary of each condition class that differs from the condition classes at *the* center. Trees selected on these fixed-radius plots are assigned to the actual condition in which they lie regardless of the recorded approximate boundary delineated.

Boundary referencing is done by recording azimuths and distances from subplot or microplot center to the reference points and/or from microplot center to the reference points (Figure 7.1 and Figure 7.2). Each boundary is marked by a maximum of three points - two where the boundary intersects the *respective fixed-radius plot* circumference, and one "corner" point between the two end points, if necessary. Only the corner point requires a distance, since the distance from the center to the circumference is always equal to the fixed plot radius.

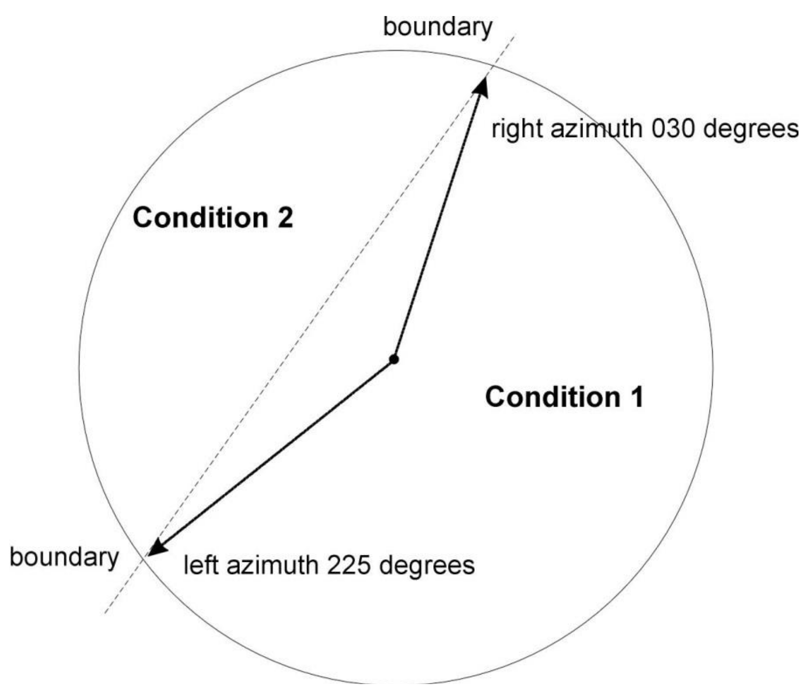


Figure 7.1. How to measure a straight boundary on a microplot or subplot.

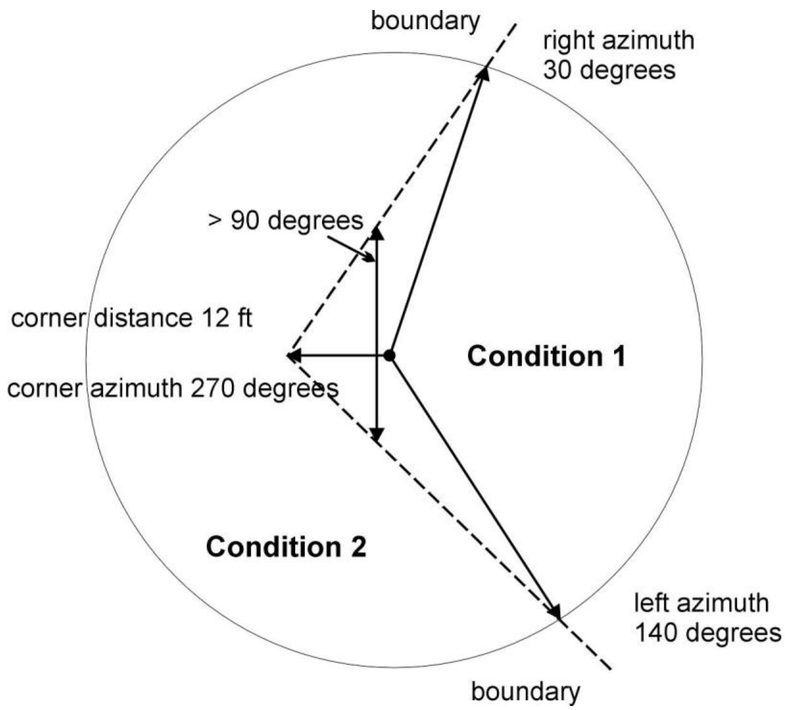


Figure 7.2. How to measure a boundary with a corner on a subplot.

Microplot boundaries are referenced to the microplot center. Note that the larger the *fixed-radius* plot, the greater likelihood of a need for a boundary corner to record boundaries that are not straight lines.

Refer to *Section 5.1 and Section 5.3 for general* condition class delineation guidelines. The following additional rules apply when referencing a boundary within a *fixed-radius plot*:

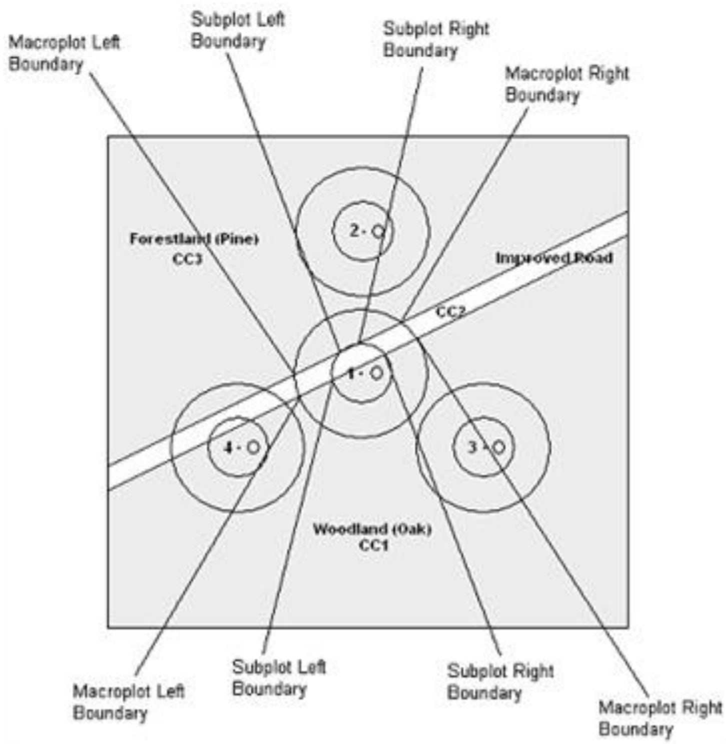
1. When a boundary between accessible forest land and nonforest land or between two contrasting accessible forest land condition classes is clearly marked, use that feature to define the boundary. Examples of clear demarcation are a fence line, plowed field edge, sharp ridge line, *defined stem line,* and water's edge along a stream course, ditch, or canal.

2. When a boundary between forest land and nonforest land is not clearly marked by an obvious feature, the boundary should follow the nonforest side of the stems of the trees at the forest edge.

3. When a boundary between two contrasting forest land condition classes is not clearly marked, map along the stems of the contrasting condition. When the boundary between two contrasting

forest land condition classes is separated by a narrow linear inclusion (creek, fire line, narrow meadow, unimproved road), establish the boundary at the far edge of the inclusion relative to subplot center.

4. Although individual *tolerances* are specified for the azimuths and distances, in practice a crew will be considered 'correct' when the difference in areas as mapped by the original crew and by the QA crew is less than 10% of the *fixed-radius plot area*. This allows for slight variations in azimuths or distances due to the approximate nature of mapping procedures.



7.2.1 BOUNDARIES ON REMEASUREMENT PLOTS

When a plot is remeasured, the crew will examine the boundaries referenced at last inventory *and reassess the condition class delineating data items*. If no change has occurred, the current crew will retain the boundary data that were recorded at last inventory. If a boundary has changed, a new boundary is present, *a procedural change has altered the boundary,* or the previous crew made an obvious error; record new or updated boundary data. Record the reason for the change in BOUNDARY CHANGE (Section 7.2.2.4). Delete boundaries that are no longer distinct. If in doubt about whether or not a boundary change has occurred, leave boundary as delineated at the previous inventory.

7.2.2 BOUNDARY DATA

Record the appropriate values for each boundary mapped on the subplot or microplot as follows:

7.2.2.1 SUBPLOT NUMBER (CORE 4.2.1)
[BOUNDARY.SUBP]

Generated code corresponding to the number of the subplot.

When Collected: All boundaries
Field width: 1 digit
Tolerance: No errors
Values:

1	Center subplot
2	North subplot
3	Southeast subplot
4	Southwest subplot

7.2.2.2 PLOT TYPE (CORE 4.2.2)
[BOUNDARY.SUBPTYP]

Record the code to specify whether the boundary data are for a subplot or microplot.

When collected: All boundaries
Field width: 1 digit
Tolerance: No errors
Values:

Null	No boundaries are recorded for the subplot
1	Subplot boundary
2	Microplot boundary

7.2.2.3 PREVIOUS PLOT TYPE (PFSL/PACIFIC ISLANDS)
[PREV_BOUNDARY_PNWRS.SUBPTYP]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the code to specify whether the boundary data were recorded for a subplot, or microplot.

When collected: SAMPLE KIND = 2
Field width: 1 digit
Tolerance: No errors
Values:

Null	No boundaries are recorded for the subplot
1	Subplot boundary
2	Microplot boundary

7.2.2.4 BOUNDARY CHANGE (CORE 4.2.3)
[BOUNDARY.BNGCHG]

Remeasurement (SAMPLE KIND = 2) locations only. Record the appropriate code to indicate the relationship between previously recorded and current boundary information.

When collected: *When* SAMPLE KIND = 2, All boundaries
Field width: 1 digit
Tolerance: No errors
Values:

0 No change - boundary is the same as indicated on plot map and/or data collected by a previous crew.

1 New boundary or boundary data has been changed to reflect an actual on-the-ground physical change resulting in a difference from the boundaries recorded.

2 Boundary has been changed to correct an error from previous crew.

3 Boundary has been changed to reflect a change in variable definition.

7.2.2.5 CONTRASTING CONDITION (CORE4.2.4)

[BOUNDARY.CONTRAST]

Record the CONDITION CLASS NUMBER of the condition class that contrasts with the condition class located at the subplot center (for boundaries on the subplot) or at the microplot center (for boundaries on the microplot), e.g., the condition class present on the other side of the boundary line.

When collected: All boundaries
Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

7.2.2.6 PREVIOUS CONTRASTING CONDITION (PFSL/PACIFIC ISLANDS

[PREV_BOUNDARY_PNWRS.CONTRAST]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the CONDITION CLASS NUMBER of the condition class that contrasted with the condition class located at the subplot center at the previous measurement (for boundaries on the subplot, or microplot), e.g., the condition class present on the other side of the boundary line.

When collected: SAMPLE KIND = 2
Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

7.2.2.7 LEFT AZIMUTH (CORE 4.2.5)

[BOUNDARY.AZMLEFT]

Record the azimuth from the subplot or microplot center to the farthest left point (facing the contrasting condition) where the boundary intersects the subplot or microplot circumference.

When collected: All boundaries
Field width: 3 digits
Tolerance: +/- 10 degrees
Values: 001 to 360

7.2.2.8 PREVIOUS LEFT AZIMUTH (PFSL/PACIFIC ISLANDS)

[PREV_BOUNDARY_PNWRS.AZMLEFT]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the azimuth from the subplot, or microplot center to the farthest left point (facing the contrasting condition class) where the boundary intersected the subplot, or microplot circumference at the previous measurement.

When collected: SAMPLE KIND = 2
Field width: 3 digits
Tolerance: +/- 10 degrees
Values: 001 to 360

7.2.2.9 CORNER AZIMUTH (CORE 4.2.6)

[BOUNDARY.AZMCORN]

Record the azimuth from the subplot or microplot center to a corner or curve in a boundary. If a boundary is best described by a straight line between the two circumference points, then record 000 for CORNER AZIMUTH (000=none).

When collected: All boundaries
Field width: 3 digits
Tolerance: +/- 10 degrees
Values: 000 to 360

7.2.2.10 PREVIOUS CORNER AZIMUTH (PFSL/PACIFIC ISLANDS)

[PREV_BOUNDARY_PNWRS.AZMCORN]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the azimuth from the subplot, or microplot center to a corner or curve in a boundary at the previous measurement.

When collected: SAMPLE KIND = 2
Field width: 3 digits
Tolerance: +/- 10 degrees
Values: 000 to 360

7.2.2.11 CORNER DISTANCE (CORE 4.2.7)

[BOUNDARY.DISTCORN]

Record the horizontal distance, to the nearest 1 foot, from the subplot or microplot center to a boundary corner point.

When collected: All boundaries when CORNER AZIMUTH > 000
Field width: 3 digits
Tolerance: +/- 1 foot
Values:
Microplot: 001 to 007 feet, (actual limiting distance is 6.8 feet)
Subplot: 001 to 024 feet

7.2.2.12 PREVIOUS CORNER DISTANCE (PFSL/PACIFIC ISLANDS)

[PREV_BOUNDARY_PNWRS.DISTCORN]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the horizontal distance as it should have been measured, to the nearest 1 foot, from the subplot, or microplot center to a boundary corner point.

When collected: SAMPLE KIND = 2
Field width: 3 digits
Tolerance: +/- 1 foot
Values:

Microplot: 001 to 007 feet, (actual limiting distance is 6.8 feet)
Subplot: 001 to 024 feet

7.2.2.13 RIGHT AZIMUTH (CORE 4.2.8)
[BOUNDARY.AZMRIGHT]

Record the azimuth from subplot or microplot center to the farthest right point (facing the contrasting condition) where the boundary intersects the subplot or microplot circumference.

When collected: All boundaries
Field width: 3 digits
Tolerance: +/- 10 degrees
Values: 001 to 360

7.2.2.14 PREVIOUS RIGHT AZIMUTH (PFSL/PACIFIC ISLANDS)
[PREV_BOUNDARY_PNWRS.AZMRIGHT]

A downloaded value that may be updated if an error was made by the previous crew. If updated, record the azimuth from the subplot, or microplot center to the farthest right point (facing the contrasting condition class) where the boundary intersected the subplot, or microplot circumference at the previous measurement.

When collected: SAMPLE KIND = 2
Field width: 3 digits
Tolerance: +/- 10 degrees
Values: 001 to 360

7.2.2.15 BOUNDARY NOTES (PNW)
[BOUNDARY.NOTES]

Record electronic BOUNDARY NOTES, if needed, to clarify or explain a special situation in the boundary being defined.

When collected: As needed
Field width: 2000 characters
Tolerance: N/A
Values: Single words and abbreviated sentences

8 TREE AND SAPLING DATA

This chapter describes how and where to tally live trees, standing dead trees (snags), and saplings. Determining which measurements are required is based on tree size, tree status, condition class status, and regional location, as well as land ownership. *Tree and sapling* data yield information on tree volume, growth, mortality, and removals; wildlife habitats; forest structure and composition; biomass; and carbon sequestration.

This chapter also describes how to record witness trees/stumps/objects. Witness information is recorded alongside the tree tally information (as witness trees and tally trees can be one in the same). Witness information assists the next field crew in relocating the center of a previously established plot/subplot.

8.1 Definitions

Trees meeting specific criteria for diameter at breast height (DBH) and length, are included in the sample. General definitions are listed below, followed by a table containing specific requirements.

Tree: An individual tree is categorized as a live tree, a standing dead tree (snag), or a sapling based on specific criteria listed in the table below. When the word "tree" is used in the field guide with no additional descriptors it applies to live trees, snags, and saplings. Applicable species are listed in Appendix 1, Tree Species Lists.

Live tree: Trees are alive if they have any living parts (leaves, buds, cambium) at or above the point of diameter measurement at DBH. Trees that have been temporarily defoliated are still alive. Uprooted trees with signs of life above the point of diameter are considered alive as long as some roots are still in substrate.

Standing dead tree (snag): To qualify as a standing dead tally tree, dead trees must be at least 5.0 inches in diameter, have a bole which has an unbroken ACTUAL LENGTH of at least 4.5 feet *for DBH species and 1.0 feet for woodland species*, and lean less than 45 degrees from vertical as measured from the base of the tree to *the point of diameter measurement*. Dead standing tally trees, and partially separated boles of dead tally trees, do not have to be self-supported. They may be supported by other trees, branches, or their crown. Standing dead trees, recorded at the previous *annual* inventory, that shrink below minimum diameter and length requirements maintain dead tree status. Portions of boles on dead trees that are separated greater than 50 percent (either above or below *the point of diameter measurement*), are considered severed. For woodland species with multiple stems, a tree is considered down if more than 2/3 of the volume is no longer attached or upright.

Sapling: Trees ≥1.0 inch but <5.0 inches *DBH that meet a minimum length requirement are tallied on the microplot.*

Tally trees: 'Tally trees' are defined as all live and standing dead trees in accessible forest land *or measurable nonforest land* condition classes encountered on the subplot the first time a subplot is established, and all trees that grow into a subplot thereafter. 'Tally saplings' are defined as all live saplings encountered the first time a microplot is established, and all saplings that grow into each microplot thereafter, *and* are included until they grow to 5.0 inches or larger, at which time they are tallied on the subplot and referenced (new AZIMUTH and HORIZONTAL DISTANCE taken) to the subplot center.

	Diameter	**Length**
Live tree (DBH species)	≥ 5.0 inches DBH	≥ 4.5 feet in length with living parts at or above DBH
Standing dead tree (DBH species)	≥ 5.0 inches DBH	≥ 4.5 feet in length (leaning less than 45 degrees from vertical)
Sapling (DBH species)	1.0 inch to 4.9 inches DBH	≥ 4.5 feet in length with living parts at or above DBH

8.2 Selecting Tally Trees

8.2.1 WHERE TO TALLY

Determining whether a tree qualifies as a "tally tree" depends upon a combination of the following:

• STATE
• OWNER CLASS
• ADMINISTRATIVE FOREST CODE
• CONDITION CLASS STATUS
• TREE SPECIES (must be listed on the Tree Species List found in Appendix 1)
• DIAMETER (DBH) of the tree
• TREE STATUS
• TREE LENGTH
• HORIZONTAL DISTANCE from the fixed-radius plot center

Trees on the subplot and microplot plot are tallied according to the following rules. If a tree is located in an area that does not meet the criteria below, it is not a tally tree.

Table 8.1: Where to tally trees in Pacific Islands

	PACIFIC ISLANDS	
CONDITION CLASS OWNERSHIP TYPE	**All lands in the Pacific Islands except Hawaii; all experimental forest lands in Hawaii**	**Non experimental forest lands in Hawaii**
TREES ARE TALLIED IN	Accessible forest land and nonforest land condition classes [CONDITION CLASS STATUS = 1 or NONFOREST CONDITION CLASS STATUS = 2]	Accessible forest land condition classes [CONDITION CLASS STATUS = 1]
MICROPLOT (6.8-foot radius)	All live saplings (1.0 inches to 4.9 inches DBH) on the microplot are tallied and referenced to the microplot center	
SUBPLOT (24.0-foot radius)	All live trees and snags ≥ 5.0 inches DBH on the subplot are tallied and referenced to the subplot center	

8.2.2 WITHIN PLOT AREA CRITERIA

Trees and saplings are selected for tally (measurement) only when the HORIZONTAL DISTANCE from the subplot center to the bole center at the ground (or top of the root collar, when present) is less than or equal to the radius of that microplot/ subplot. Trees must be selected for tally within the appropriate fixed-radius area without error. The tolerances for HORIZONTAL DISTANCE to trees (Section 8.4.1.14) do not apply when determining whether a tree is tallied within the specified plot area.

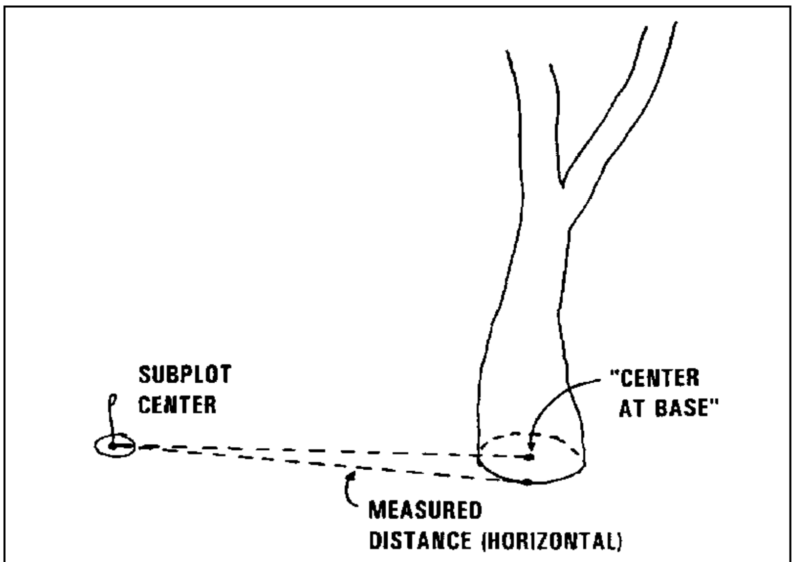


Figure 8.1: Horizontal distance from plot center criteria for determining tally trees

8.3 Conducting the Tree Tally

<u>Begin tallying trees at an azimuth of 001 degrees from subplot center and continue clockwise around the *subplot. Work outward from subplot center to subplot perimeter. R*epeat this sequence for trees</u>

on the microplot. Select, record, and tag subplot witness trees/stumps/objects while recording tree tracking data on the subplot.

8.3.1 SUBPLOT WITNESS TREES/OBJECTS

Each of the four subplot center stakes or metal pins should be referenced by a minimum of two subplot witness trees/objects. Use the following procedures to select and record witnesses. Refer to Table 3.2: Standards for monumentation of various witness types, for specific monumentation guidelines.

A. **Selecting witnesses:** Select two trees/objects near the subplot center which form, as closely as possible, a right angle with the center marker. Trees within six feet of the subplot center are preferable. If live trees are not available, use sound snags, stumps, or objects. On subplots established previously, reuse the previous witness trees, unless better trees are available.

B. **Monumenting witnesses:** Monumentation procedures vary depending on the subplot being witnessed; plot center (PC, center of subplot 1) has different monumentation than subplots 2 through 4. Refer to Table 3.2:: Standards for monumentation of various witness types, for specific monumentation guidelines.

C. **Recording witness data (all subplots on the standard layout):** Identify witness trees/snags/stumps/objects in the data recorder (PDR) using the procedures listed below:
   - **Tally tree/snag (a trackable tree record):** Record SUBPLOT TALLY TREE WITNESS FLAG = Y (Section 8.4.1.9) to mark tally trees/snags as witnesses.
   - **Non-tally tree/snag:** Enter a new record for the tree/snag; record PRESENT TREE STATUS = 8, witness non-tally tree (Section 8.4.1.8).
   - **Stump**: Enter a new record for the stump; record PRESENT TREE STATUS = 7, witness stump (Section 8.4.1.8). Note: When recording stumps as witnesses, use the guidelines listed in section 8.5.2 (Diameter on Stumps) to measure diameter.
   - **Shrub or object:** Enter a new record for the shrub or object; record PRESENT TREE STATUS = 9, witness-only object (Section 8.4.1.8). Note: Record the shrub species name in TREE NOTES (Section 8.12).

In addition, record the following information for each witness:

- SPECIES- If applicable (Section 8.4.1.12)
- AZIMUTH-Subplot center to tree (Section 8.4.1.13)
- SLOPE DISTANCE TO WITNESS TREE OR OBJECT – From the subplot stake/pin where it enters the ground to the head of the top nail affixing the basal tag or tree number tag (Section 8.4.1.15)
- DIAMETER (Section8.5.3.2)

Note : For witnesses, distance is always recorded as a slope distance from the subplot center to the tag at the base of the tree, rather than as a horizontal distance to the center of the tree collected for tally trees.

8.3.2 SUBPLOTS/CONDITIONS WITHOUT TALLY TREES

This section provides information about recording tree data on subplots with special circumstances.

- If all accessible forest condition classes within subplot 1 have no tally trees present, two records are required to **witness subplot center**. These witness records can represent sound stumps or snags, but live trees are preferable.
- If the plot is entirely nonforest and it was ground visited, record two witness records for subplot 1.
- If the plot is entirely nonforest and it is on experimental forest lands, record two witness records for each subplot.

8.4 Tree Tracking

8.4.1 TREE TRACKING DATA ITEMS

8.4.1.1 SUBPLOT NUMBER (CORE 5.1)

[SUBP]

A 1-digit code, generated for each tree record entered into the PDR, regardless of the status of a tree (live tree, snag, witness-only tree, etc.).

When Collected: All tree records
Field width: 1 digit
Tolerance: No errors
Values:

1	Center subplot
2	North subplot
3	Southeast subplot
4	Southwest subplot

8.4.1.2 TREE RECORD NUMBER (CORE 5.2)

[TREE]

A 3-digit code, assigned by the PDR, to uniquely and permanently identify each tree on a given subplot. At the time of remeasurement (SAMPLE KIND = 2), TREE RECORD NUMBERS will be downloaded for previously recorded trees, snags, and witness-only records. TREE RECORD NUMBERS cannot be changed by the field crew.

When Collected: All tree records
Field width: 3 digits
Tolerance: No errors
Values: 001 to 999

8.4.1.3 TREE TAG NUMBER (PFSL/PACIFIC ISLANDS) [TAG_NO_PNWRS]

Affix an aluminum tree number tag and record a TREE TAG NUMBER for all tally trees ≥ 1.0 inch DBH (**except** witness-only trees) sampled at the current inventory; this includes trees recorded, but not tagged, during a previous visit (e.g., saplings and snags). Number trees in a clockwise order from AZIMUTH 001 to 360, and work outwards from subplot center to subplot perimeter. Repeat this sequence for saplings on the microplot. Attempt to keep tree numbers in order. However, **do not** renumber all trees on a microplot/subplot in order to assign a more “correct” tree number to a missed tree.

Saplings <3.0 inches DBH: Wire the tag to an ancillary branch

Saplings ≥ 3.0 inches DBH: Nail the tag below stump height and facing microplot center.

Trees ≥ 5.0 inches DBH: Nail the tag below stump height and facing subplot center.

- Live trees: Drive the nail in only as far as is necessary to firmly anchor it in the wood. If a tree which requires a TREE TAG NUMBER has a PNW-FIA tag, discard it. If an old tag cannot be removed, pound it in until flush with the bark so it will be overgrown and will not be confused with the new tag.

- Standing dead trees: Pound the nail flush with the bole on all standing dead trees; including previously live trees, which are now dead.

Do not use a TREE TAG NUMBER more than once on a plot. Before leaving the vehicle, make sure the tree numbers previously assigned to downloaded trees are different than numbers on the new tags you may use.

***Special Note for Hawaii only:** Lands owned by the Division of Forestry and Wildlife (DOFAW) – Do not affix any tags or nails below 6.0 ft. If the dbh is taken at 6.0 feet or lower place the nail at 6.0 feet and measure down for length to diameter. If the dbh is taken above 6.0 feet place the nail at the dbh location. For tree ferns pound the nail in flush at the diameter point, regardless of location.
***Special Note for American Samoa only**: On lands managed by the National Park Service do not affix any lower tags or nails on tally trees and saplings. Only affix one nail and tree number tag at DBH,

When Collected: WHEN PRESENT TREE STATUS = 1; or when PRESENT TREE STATUS = 2 and STANDING DEAD = 1
Field width: 3 digits
Tolerance: No errors
Values: 001 to 999

8.4.1.4 PREVIOUS TAG NUMBER (PFSL/PACIFIC ISLANDS) [PREV_TAG_NO_PNWRS]

If any tree tallied at the current inventory has a tree number tag from the previous visit, record the tag number. This item is recorded for live trees, dead trees, and saplings, and will help link current data to previously collected data.

If more than one old tree number tag is present, record the one from the most recent inventory.

If more than one old tree number tag is present and **a tag is reused**, record the TREE TAG NUMBER from the previous visit for the “current” TREE TAG NUMBER and also for PREVIOUS TREE TAG NUMBER.

When Collected: WHEN SAMPLE KIND = 2
Field width: 3 digits
Tolerance: No errors
Values: 001 to 999

8.4.1.5 CONDITION CLASS NUMBER (CORE 5.3)

[CONDID]

Record the CONDITION CLASS NUMBER in which each tree is located. Often, a referenced boundary is approximate, and trees selected for tally are assigned to the actual condition in which they lie regardless of the recorded approximate boundary (Figure 8.2).

On remeasurement plots (SAMPLE KIND = 2), the previous CONDITION CLASS NUMBER is downloaded and displayed on the PDR for each remeasurement tree. If necessary, change the CONDITION CLASSNUMBER to reflect current condition classes and boundaries.

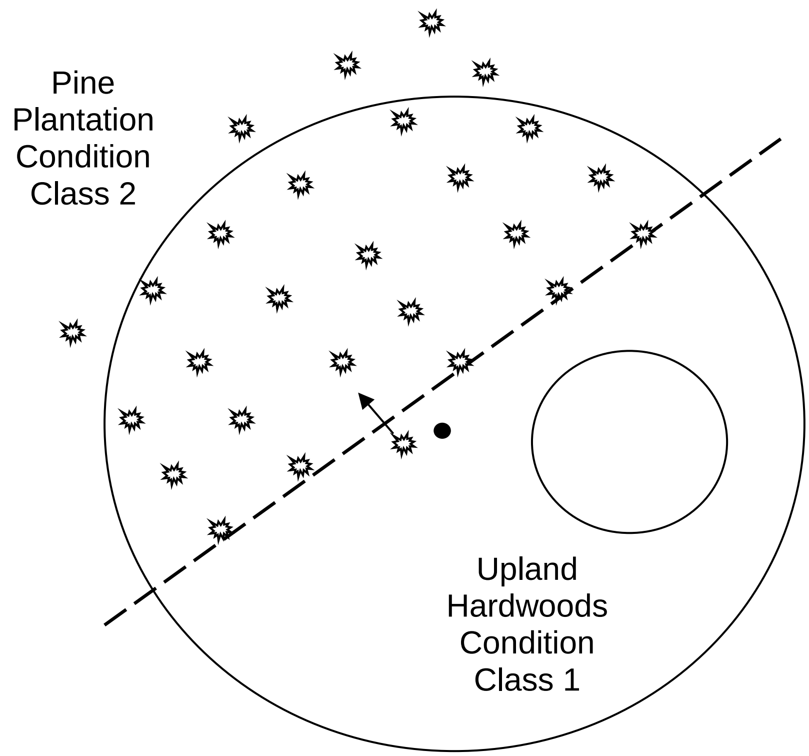


Figure 8.2: Ragged CONDITION CLASS boundary and tree condition class designation.

When Collected: All tally trees
Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

8.4.1.6 PREVIOUS CONDITION CLASS NUMBER (PFSL/PACIFIC ISLANDS)

[PREVCOND]

A downloaded value that may be updated if an error was made by the previous crew. Only edit and change PREVIOUS CONDITION CLASS NUMBER if the previous crew made a mistake. The data recorder will automatically update the PREVIOUS CONDITION CLASS NUMBER if none of the previous boundaries have changed. If any of the previous boundaries have been changed, the current crew is required to assign the previously tallied trees to a corrected PREVIOUS CONDITION CLASS NUMBER

When Collected: SAMPLE KIND = 2
Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

8.4.1.7 PREVIOUS TREE STATUS (CORE 5.6)

[PREV_STATUS_CD]

A downloaded code for all trees tallied at the previous inventory. This code is used to track the status of sample trees over time; correct even if the tree no longer qualifies as a tally tree. Add PREVIOUS TREE STATUS if null and tree was not tallied at the previous inventory because of a definition or procedural change (RECONCILE = 10).

When collected: SAMPLE KIND = 2: all previously tallied trees ≥ 1.0 inch DBH. Update when null and RECONCILE = 10.

Field width: 1 digit
Tolerance: No errors
Values:

- 1 Live Tree – alive at the previous inventory
- 2 Dead tree – standing dead tree at the previous inventory
- 8 Witness Non-Tally Tree – A non-tally live or dead tree that is used for a subplot witness
- 9 Witness-Only – A subplot witness that is not a tree. It may be a shrub, rock or other.

8.4.1.8 PRESENT TREE STATUS (CORE 5.7)

[STATUSCD_PNWRS; Regional codes 7, 8, 9 loaded in NON_TALLY_TREE_PNWRS]

Record a PRESENT TREE STATUS for each tallied tree; this code is used to track the status of sample trees over time: as they first appear, as ingrowth, as they survive, and when they die or are removed. Witness-only trees/stumps/objects are also assigned a PRESENT TREE STATUS.

When Collected: When SAMPLE KIND = 1: all new live tally trees ≥ 1.0 inches DBH; all new dead tally trees ≥ 5.0 inches DBH; and witness non-tally trees, witness stumps, and witness-only objects. When SAMPLE KIND = 2: all previously tallied trees.

Field width: 1 digit
Tolerance: No errors
Values:

0 No Status - Remeasurement plots only. Tree is not presently in the sample. Tree was incorrectly tallied at the previous inventory, currently is not tallied due to definition or procedural change, or is not tallied due to natural causes. *(e.g., moved beyond the radius of the plot by small earth movement, hurricane, etc.).* Requires RECONCILE code = 5-9.

1 Live tree – any live tally tree (new, remeasured or ingrowth)

2 Dead tree -- Any dead tree (new, remeasured or ingrowth) regardless of cause of death. Includes all previously standing dead trees that no longer qualify as standing dead, as well as trees killed by silvicultural or land clearing activity, and are assumed not to have been utilized. *Includes: previously dead standing, now down, and previously dead standing that no longer meet diameter and length requirements.*

3 Removed - Remeasurement plots only. A tree that has been cut or removed by direct human activity related to harvesting, silvicultural activity or land clearing. The tree is assumed to have been utilized.

7 Witness Stump – A subplot witness that is a stump

8 Witness Non-Tally Tree – A **non-tally** live or dead tree that is to be used for a subplot witness

9 Witness-Only Object – A subplot **witness that is not a tree.** It may be a shrub, rock, or other; TREE NOTES are required to describe the witness.

8.4.1.9 SUBPLOT TALLY TREE WITNESS (PNW) [SUBP_WITNESS_FLAG_PNWRS]

Use this data item to mark the current tally tree (live or dead) as a witness. See Section 3.5, “Referencing the plot”, for witness monumentation instructions. Note: The default for this item is “N”**.**

When collected: When PRESENT TREE STATUS = 1; or when PRESENT TREE STATUS = 2 and STANDING DEAD = 1

Field width: 1 digit
Tolerance: No errors
Values:

Y – current record is a tally tree witness
N – current record is not a tally tree witness

8.4.1.10 STANDING DEAD (CORE 5.7.2) [STANDING_DEAD_CD]

Record the code that describes whether or not a tree qualifies as standing dead. Standing dead trees must be at least 5.0 inches in diameter, have a bole which has an unbroken ACTUAL LENGTH of at least 4.5 feet, and lean less than 45 degrees from vertical as measured from the base of the tree to 4.5 feet. See figures below for examples.

“Unbroken” is defined as at least 50 percent attached to the original source of growth. The degree of lean on dead trees with partially separated (i.e., 1 to 50 percent) boles is measured from the ground to the top of ACTUAL LENGTH.

Portions of boles on dead trees that are separated greater than 50 percent (either above or below 4.5 feet), are considered severed and are included in Down Woody Material (DWM) if they otherwise meet DWM tally criteria.

Live and dead standing tally trees, and partially separated boles of dead tally trees, do not have to be self-supported. They may be supported by other trees, branches, or their crown.

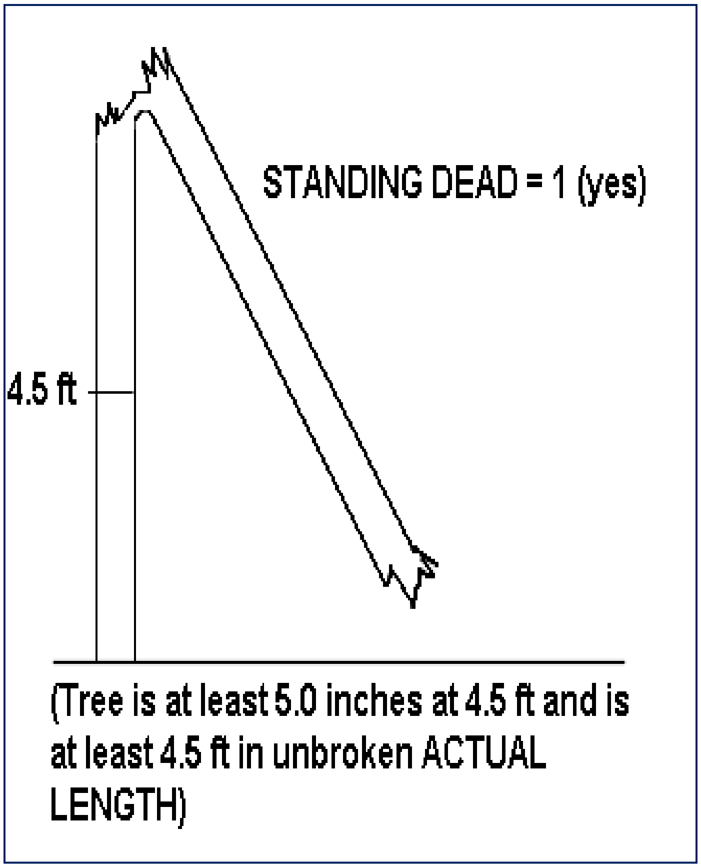


Figure 8.3: Example of an unbroken bole to 4.5 feet

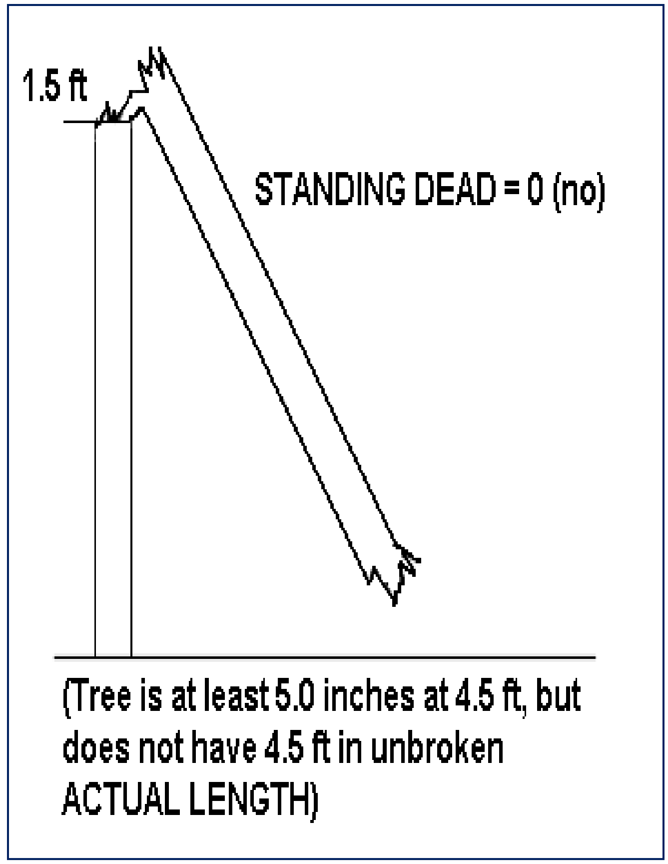


Figure 8.4: Example of an unbroken bole of < 1.5 feet

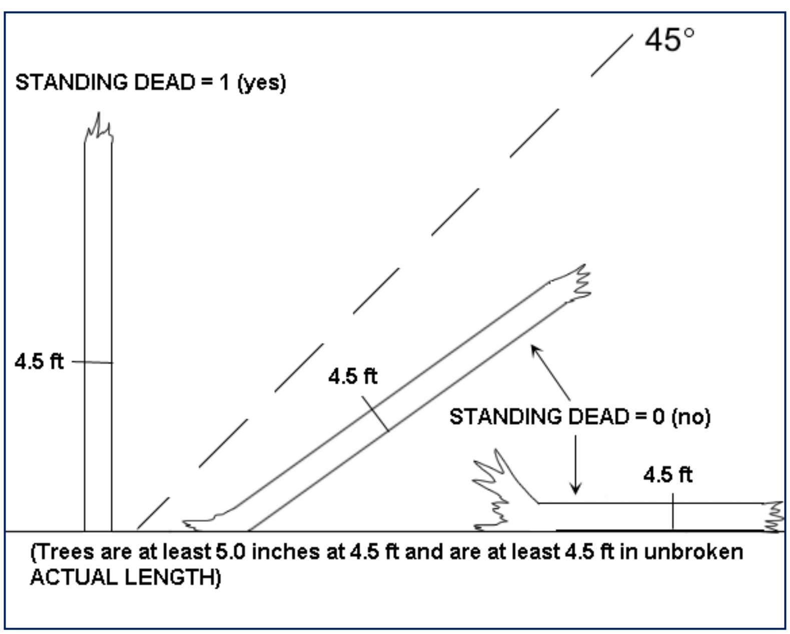


Figure 8.5: Other examples of dead trees

When collected: All dead tally trees (PRESENT TREE STATUS = 2)
Field width: 1 digit
Tolerance: No errors
Values:

0	No – tree does not qualify as standing dead.
1	Yes – tree does qualify as standing dead.

8.4.1.11 RECONCILE (CORE 5.7.1)
[RECONCILECD]

For remeasurement locations only, record a RECONCILE code for any new tally tree that was not tallied in the previous inventory, and for all no status remeasurement trees (PRESENT TREE STATUS = 0). This code is used to identify the reason a new tree appeared in the inventory, and identify the reason a remeasurement tree no longer qualifies as a tally tree.

Code 5 is used to indicate live trees that shrink below the diameter threshold on the microplot/subplot. For example, if a live remeasurement tree shrinks below the 5.0 inch DBH, then record the following combination of codes: PREVIOUS TREE STATUS = 1, PRESENT TREE STATUS = 0, RECONCILE = 5. If a live measured tree shrinks below the 5.0 inch threshold on the subplot and is currently greater than or equal to 1.0 inch on the microplot, then record PREVIOUS TREE STATUS = 1, PRESENT TREE STATUS = 1. Record all required items for a tally sapling.

When Collected: On SAMPLE KIND = 2; all new live tally trees ≥ 1.0 in DBH (PRESENT TREE STATUS = 1 and no PREVIOUS TREE STATUS), all new dead tally trees ≥ 5.0 in (PRESENT TREE STATUS = 2 and no PREVIOUS TREE STATUS), all no status trees (PRESENT TREE STATUS = 0)

Field width: 2 digits
Tolerance: No errors
Values:

Codes 1-4 & 10 are valid for new trees on the plot:

Values	Description
1	Ingrowth – either a new tally tree not qualifying as through growth or a new tree on land that was formerly nonforest and now qualifies as forest land (reversion or encroachment).
2	Through growth – new tally tree 5.0 inches DBH and larger, within the microplot, which was not missed at the previous inventory.
3	Missed live – a live tree missed at previous inventory and that is live or dead now.
4	Missed dead – a dead tree missed at previous inventory that is dead now.

Codes 5-9 are valid for remeasured trees that no longer qualify as tally:

5	Shrank – live tree that shrank below threshold diameter on microplot/subplot.
6	Missing (moved) – tree was correctly tallied in previous inventory, but has now moved beyond the radius of the plot due to natural causes (i.e., small earth movement, hurricane). Tree must be either live before and still alive now or dead before and dead now. If tree was live before and now dead, this is a mortality tree and should have PRESENT TREE STATUS = 2 (not 0).
7	Cruiser error – erroneously tallied at previous inventory.

8 Procedural change – tree was tallied at the previous inventory, but is no longer tallied due to a definition or procedural change.
9 Tree was sampled before, but now the area where the tree was located is nonsampled. All trees on the nonsampled area have RECONCILE = 9.

8.4.1.12 SPECIES (CORE 5.8)
[SPCD; PREV_SPCD_PNWRS]

Record the appropriate SPECIES code from the list beginning in Appendix 1. If a species is encountered that is not listed in Appendix 1 and it is not clear if it should be tallied as a tree, consult the Field Supervisor. If the species cannot be determined in the field, tally the tree, but bring branch samples, foliage, cones, flowers, bark, etc. to the supervisor for identification. If possible, collect samples outside the subplots from similar specimens and make a note to correct the SPECIES code later. Use code 0299 for unknown dead conifer, 0998 for unknown dead hardwood when the genus or species codes cannot be used, and 0999 for other or unknown live tree. The generic code should only be used when you are sure the species is on the species list, but you cannot differentiate among acceptable species. This is often the case with standing dead trees on newly established plots. In this case use the sample collections procedures described earlier in this paragraph.

Note: The Tree Species List appendix contains all tree species designated as "Core" on the national list and all additional species tallied in PNW during the current inventory. Codes **0299** and **0998** are valid for live trees in the Pacific Islands.

On remeasurement plots (SAMPLE KIND = 2), previous SPECIES information will be downloaded and displayed in the current SPECIES field in the PDR for each remeasurement tree. Correct the SPECIES code if the SPECIES was incorrectly identified, or SPECIES = 999 at the last inventory, even if the tree is no longer a valid tally tree (PRESENT TREE STATUS = 0).

When Collected: All trees (PRESENT TREE STATUS = 0-8)
Field width: 4 digits
Tolerance: No errors
Values: See Appendix 1 (Tree Species List)

8.4.1.13 AZIMUTH (CORE 5.4)
[AZIMUTH; PREV_AZM_PNWRS]

Sight the AZIMUTH from the subplot center (for trees ≥ 5.0 inches DBH) or the microplot center (for trees ≥ 1.0 inch and < 5.0 inches DBH), to the center of the base of the tree, Record AZIMUTH to the nearest degree. Use 360 for north.

*Note: When prop roots are present, sight the azimuth to the center of the tree at the top of the root collar.

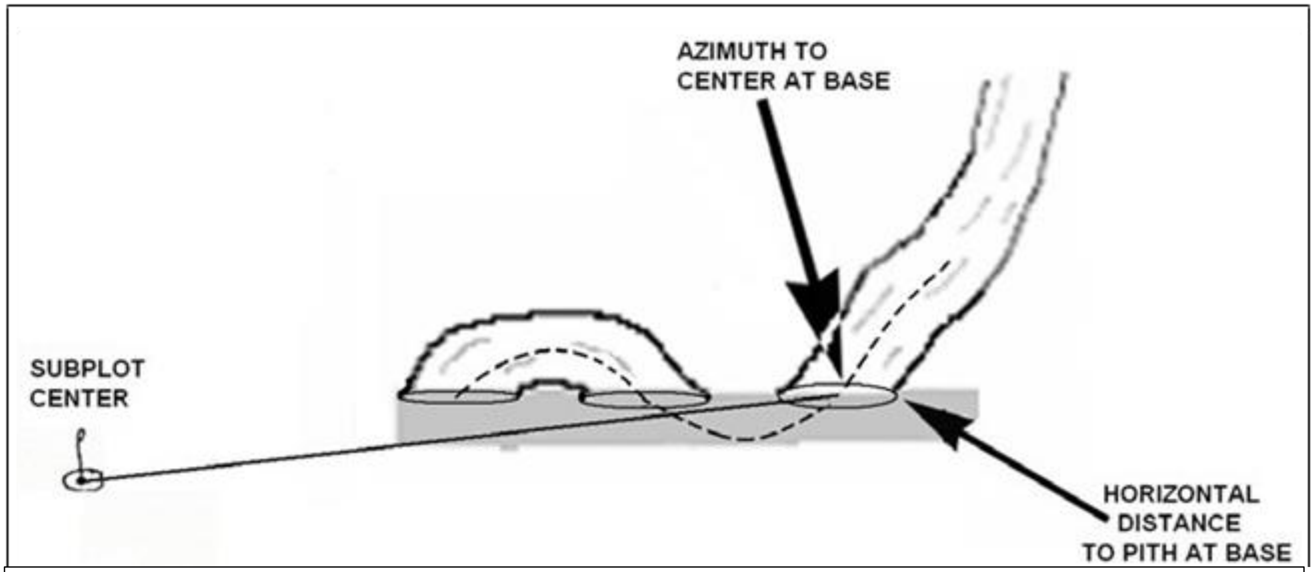


Figure 8.6: Where to measure AZIMUTH and HORIZONTAL DISTANCE when the main tree bole goes below the duff layer and reemerges

When Collected: All live tally trees ≥ 1.0 inches DBH and standing dead tally trees ≥ 5.0 inches DBH, and witness-only trees/stumps/objects. When SAMPLE KIND = 2, downloaded previous AZIMUTH must be verified.

Field width: 3 digits
Tolerance: Tally trees: +/- 10 degrees; Witness only trees/stumps/objects: =/- 4 degrees
Values: 001 to 360

8.4.1.14 HORIZONTAL DISTANCE (CORE 5.5)
[DIST; PREV_HORIZ_DIST_PNWRS]

Record the measured HORIZONTAL DISTANCE, to the nearest 0.1 foot, from the subplot center (for trees greater than or equal to 5.0 inches DBH) or microplot center (for trees greater than or equal to 1.0 inch and less than 5.0 inches DBH) to the pith of the tree at the base.

*Note: Where prop roots are present, take the HORIZONTAL DISTANCE to the pith of the tree at the top of the root collar.

On remeasurement plots (SAMPLE KIND = 2), previous HORIZONTAL DISTANCE will be downloaded into the current HORIZONTAL DISTANCE field. The current crew is responsible for verifying downloaded data and updating when it is out of tolerance. There is no tolerance for added or missed trees regardless of the previous crew's downloaded data.

For saplings on the microplot that become trees (at the time of plot remeasurement), crews must collect new HORIZONTAL DISTANCE information from the subplot center. For live trees on the subplot that shrink to become saplings on the microplot at remeasurement, crews must collect new HORIZONTAL DISTANCE from the microplot center.

When Collected: All live tally trees ≥ 1.0 in DBH and standing dead tally trees ≥ 5.0 in DBH. When SAMPLE KIND = 2, downloaded previous DISTANCE must be verified.

Field width: 3 digits (xx.y)
Tolerance: Microplot: +/- 0.2 feet
Subplot: +/- 1.0 feet
Values: Microplot: 00.1 to 6.8;
Subplot: 00.1 to 24.0

8.4.1.15 SLOPE DISTANCE TO WITNESS TREE OR OBJECT (PNW) [SLOPE_DIST_TO_WITNESS_PNWRS]

Record the SLOPE DISTANCE, to the nearest 0.1 foot, from the base of the subplot center pin, to the head of the nail that affixes the basal tag or other witness object. If more than one nail is used to affix the basal tag, measure to the head of the top nail. If a basal tag cannot be attached to the witness tree/object, or if in national parks or lands owned by the Department of Fish and Wildlife in Hawaii (DOFAW), (see “Recording witness tree data” found in section 3.7) where basal tags cannot be used, measure from the base of the subplot to the front of the tree/object at the base.

On remeasurement plots (SAMPLE KIND = 2), previous SLOPE DISTANCE will be downloaded into the current SLOPE DISTANCE field. The current crew is responsible for verifying downloaded data and updating when it is out of tolerance.

Note when recording a horizontal distance for the slope distance you must add a tree note.

When Collected: All witness trees, stumps, or objects (PRESENT TREE STATUS = 1 or 2 and SUBPLOT TALLY TREE WITNESS FLAG = Y; or PRESENT TREE STATUS = 7, 8, or 9). When SAMPLE KIND = 2: previous SLOPE DISTANCE must be verified.

Field width: 4 digits (xxx.y)
Tolerance: +/- 0.2 feet
Values: 00.1 to 99.9

8.5 Diameter

***Special Note for Hawaii Only: For plots found on Lands owned by the Division of Forestry and Wildlife (DOFAW)** there should be no nails in trees below 6.0 feet. Use the following procedures:

8.5.1 MARKING CURRENT DIAMETER

1. Marking saplings < 3.0 inches DBH tallied for the first time:
   - Mark location of diameter measurement with a grease pencil. Each stem of a multi-stemmed woodland species must be marked.

2. Marking live DBH species ≥ 3.0 inches DBH, or snags ≥ 5.0 inches DBH, tallied for the first time:
   - Set an aluminum nail at the point of diameter measurement. Place the nail on the side of the tree facing subplot/microplot center. **On steep slopes**, where placing the nail towards subplot/microplot center is not possible, place the nail on the uphill side of the bole. The

nail should be driven in only as far as is necessary to firmly anchor it in the wood.
- Use caution to avoid damaging trees.

3. Additional instructions for marking diameter on trees ≥ 32.0 inches:

   If a live tree or snag (new or remeasured) is 32.0 inches DBH or larger, affix an additional nail, and for every additional 12 inches of diameter add another nail, distributing the nails evenly around the circumference of the bole (e.g., a 44.3 inch tree would have three nails around the circumference of the tree at DBH – ideally, one on the uphill side of the tree and the other two about 1/3 of the way around the tree on each side). Set these nails while the diameter tape is wrapped around the tree at the point of diameter.

4. Marking DBH on trees previously marked:

   The DBH location on previously tallied trees ≥ 3.0 inches was marked with an aluminum nail. Remeasure diameter at the location of the previous crew's nail if appropriate using the rules below:

   - For live trees: Reset the old nail enough so that as much of the old nail is exposed as possible. If the old nail cannot be pulled out to meet this requirement, set a new nail at the same location.
   - For dead trees: Pound the nail flush with the bole.
   - For live and dead trees: If the previous location is no longer accessible (e.g., covered by a landslide), there is an abnormality at the PREVIOUS DIAMETER measurement point, or it is more than 12 inches away from where the diameter should be measured according to current protocols (either because protocols have changed or the previous crew made a mistake) move the point of measurement and the nail, and assign a DIAMETER CHECK code of "2".
     - If the point of DBH measurement is being moved (on live or dead trees), follow the instructions outlined in *Section 8.5.3.1, PREVIOUS DIAMETER AT BREAST HEIGHT* to estimate a new PREVIOUS DIAMETER AT BREAST HEIGHT.
     - If the old nail marks a point of diameter measurement not used at the current inventory, remove it if possible; otherwise pound it in flush with the tree.
   - If the previous nail falls within the range of tolerance outlined above, do not pull it out of the tree just because it is not facing the subplot center. Keep original placement of nails at all times unless there is an obvious error.

5. <u>The following apply at remeasurement:</u>
   - <u>If at the previous visit a forked tree was recorded as two separate trees but should have been recorded as one tree, give one of the tree data lines a PRESENT TREE STATUS = 0, RECONCILE = 7 or 8, and a TREE NOTE *(remove the D.B.H. nail)*. The remaining tree data line receives PRESENT TREE STATUS = 1 or 2 with DIAMETER CHECK = 2, and a TREE NOTE. Correct the *PREVIOUS DIAMETER AT BREAST HEIGHT (Section 8.5.3.1) and relocate the D.B.H. nail.*</u>
   - <u>If at the previous visit a forked tree was recorded as one tree but should have been recorded as two separate trees, correct the *PREVIOUS DIAMETER AT BREAST HEIGHT*</u>

for the remeasured tree to represent one tree, and add the other fork as a missed tree. Use the existing tree data line to represent one of the stems; PRESENT TREE STATUS = 1 or 2, DIAMETER CHECK = 2, and a TREE NOTE. The second stem would get PRESENT TREE STATUS = 1 or 2, RECONCILE = 3 or 4, and a TREE NOTE.

The following are normal procedures that are to be followed with the exception of the addendums written above for lands owned by the Division of Forestry and Wildlife (DOFAW). If the diameter cannot be physically measured for any reason, estimate the diameter using a Relaskop or electronic equivalent. These procedures are described in Appendices 9 and 10.

8.5.2 DIAMETER ON STUMPS

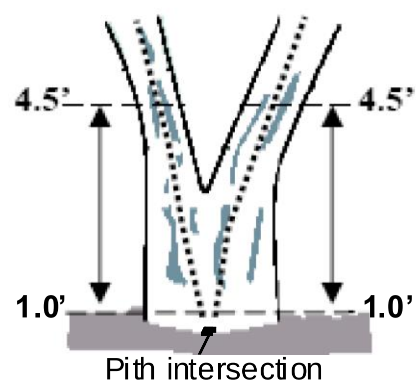
Diameter on stump < 4.5 feet tall: Use a logger's tape, cloth tape or ruler to measure the longest and shortest axes across the top of the stump. Record diameter as the average of the two measurements.

8.5.3 DIAMETER AT BREAST HEIGHT

Special DBH situations:

1. **Forked tree:** In order to qualify as a fork, the stem in question must be at least 1/3 the diameter of the main stem and must branch out from the main stem at an angle of 45 degrees or less. Forks originate at the point on the bole where the piths intersect. Forked trees are handled differently depending on whether the fork originates below 1.0 foot, between 1.0 and 4.5 feet, or above 4.5 feet. For trees with prop roots, consider the top of the prop roots the base of the tree for forking purposes and recognize all otherwise qualifying forks that occur within 3.5 feet of the top of the prop roots.

   A. **Trees forked below 1.0 ft.** Trees forked in this region are treated as distinctly separate trees (*Figure 8.7*) and the diameter and angle rules listed above do not apply. However, lateral branches below one foot on a single stemmed tree are not stems and should not be tallied. Distances and azimuths are measured individually to the center of each stem where it splits from the stump . DBH is measured for each stem at 4.5 feet above the base of the tree. When stems originate from pith intersections below 1 foot, it is possible for some stems to be within the limiting distance of the microplot or subplot, and others to be beyond the limiting distance. If stems originating from forks that occur below 1.0 foot fork again between 1.0 and 4.5 feet , the rules in the next paragraph apply.



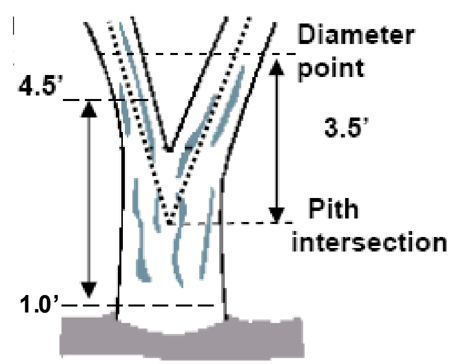


Figure 8.8: Forked between 1.0 and 4.5 feet

B. **Trees forked between 1.0 feet and 4.5 ft.** Trees forked between 1.0 foot and 4.5 feet are also counted as separate trees (Figure 8.8), but only one distance and azimuth (to the central stump) is recorded for each stem. Although a single azimuth and distance applies to all, multiple stems should be recorded as they occur in clockwise order (from front to back when one stem is directly in front of another). The DBH of each fork is measured at a point 3.5 feet above the pith intersection. When forks originate from pith intersections between 1.0 and 4.5 feet, the limiting distance is the same for all forks--they are either all on, or all off the plot.

- Multiple forks are possible if they all originate from approximately the same point on the main stem. In such cases, measure DBH on all stems at 3.5 feet above the common pith intersection.

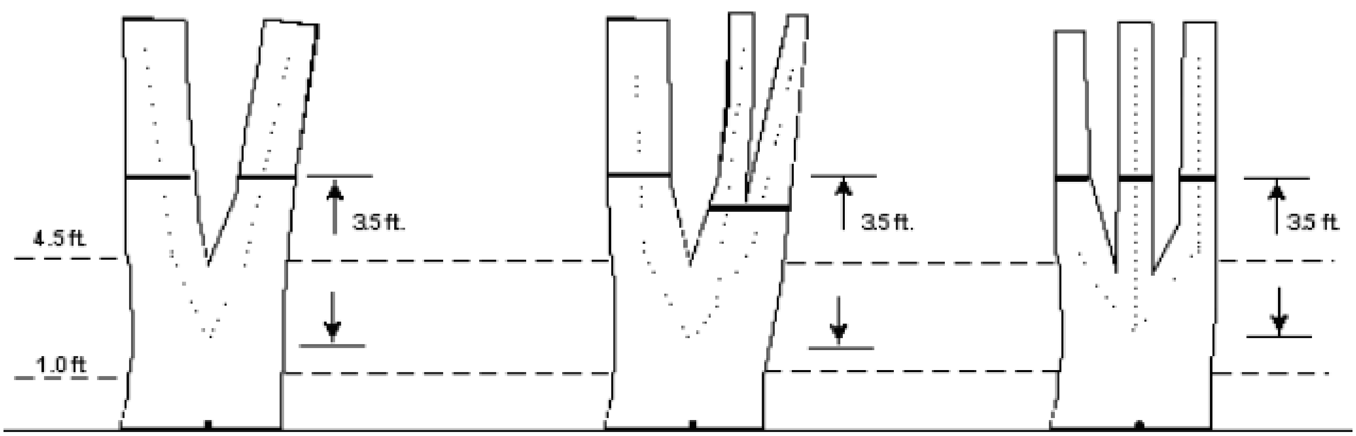


FIGURE 8.9: WHERE TO MEASURE DBH, DISTANCE, AND AZIMUTH ON FORKED TREES.

- Once a stem is tallied as a fork that originated from a pith intersection between 1.0 and 4.5 feet, do not recognize any additional forks that may occur on that stem. Measure the diameter of such stems at the base of stem separation (i.e., do not move the point of diameter the entire 3.5 feet above the first fork).

C. **Trees forked at or above 4.5 ft.** Trees forked at or above 4.5 feet count as one single tree (*Figure 8.9*). If a fork occurs at or immediately above 4.5 feet, measure diameter below the fork just beneath any swelling that would inflate DBH.

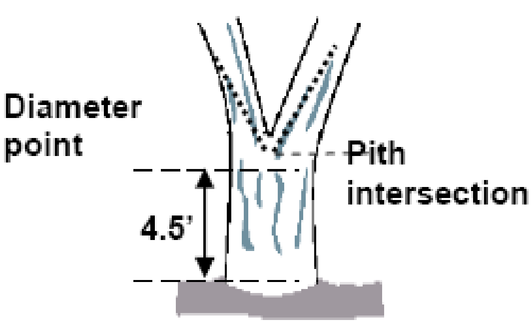


Figure 8.10: Tree forked above 4.5 ft

2. **Stump Sprouts.** Stump sprouts originate between ground level and 4.5 feet on the boles of trees that have died or been cut. Stump sprouts are handled the same as forked trees, with the exception that stump sprouts are not required to be 1/3 the diameter of the dead bole. Stump sprouts originating below 1.0 foot are measured at 4.5 feet from ground line. Stump sprouts originating between 1.0 foot and 4.5 feet are measured at 3.5 feet above their point of occurrence. As with

forks, rules for measuring distance and azimuth depend on whether the sprouts originate above or below 1.0 foot.

3. **Tree with butt-swell or bottleneck**: Measure these trees 1.5 feet above the end of the swell or bottleneck if the swell or bottleneck extends 3.0 feet or more above the ground (*Figure 8.11*).

4. **Tree with irregularities at DBH**: On trees with swellings , bumps, depressions, and branches at DBH, diameter will be measured immediately above the irregularity at the place it ceases to affect normal stem form (*Figure 8.11 through 8.13)*.

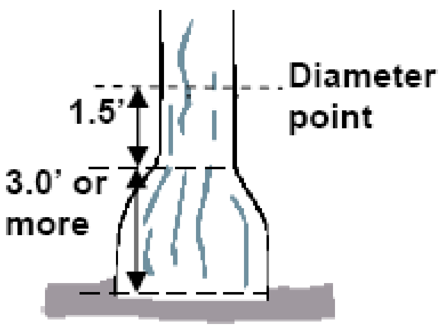


Figure 8.11: Bottleneck tree, *butt swell*

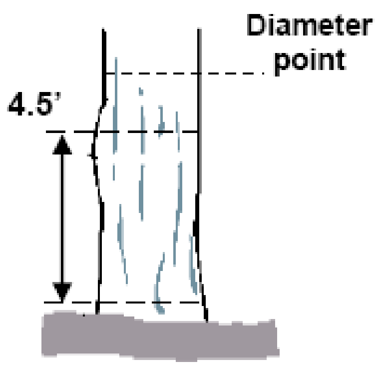


Figure: 8.12: Tree with *a swell at 4.5 feet*

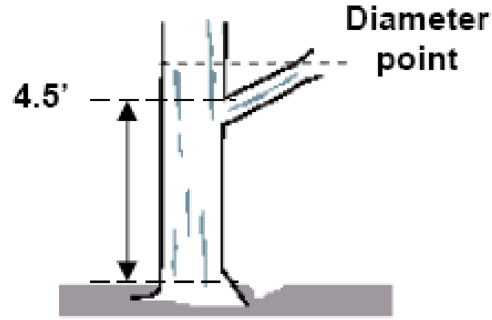


Figure 8.13: Tree with a branch at *4.5 feet*

5. **Tree on slope**: Measure diameter at 4.5 feet from the base of the tree along the bole on the uphill side of the tree (*Figure 8.14: Tree on a slope).*

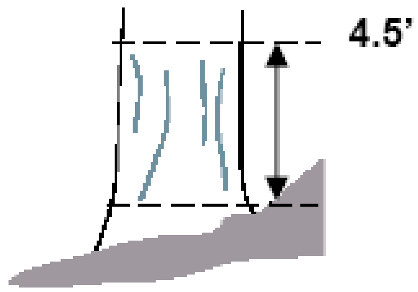


Figure 8.14: Tree on a slope.

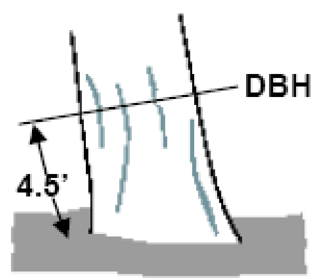


Figure 8.15: Leaning tree**.**

6. **Leaning tree**: Measure diameter at 4.5 feet from the base of the tree along the bole. The 4.5 foot distance is measured along the underside face of the bole (*Figure 8.15: Leaning tree*).

7. **Turpentine tree**: On trees with turpentine face extending above 4.5 feet, estimate the diameter at 10.0 feet above the base of the tree and multiply by 1.1 to estimate DBH outside bark.

8. **Independent trees that grow together**: If two or more independent stems have grown together at or above the point of DBH *(Figure 8.16),* continue to treat them as separate trees. Set two diameter nails at DBH halfway around the tree's circumference from each other (after placing 1st nail, stand back from bole; take azimuth to nail; on opposite side of bole, place nail where the back azimuth of the first nail lines up). Measure the distance between the nails with a diameter tape. Multiply the measurement by 2 and record the result as the current diameter. Example: Distance measured = 12.8 inches (12.8 X 2) = 25.6 inches. Set the DIAMETER CHECK code to “7”. See figure 8.16 for a visual.

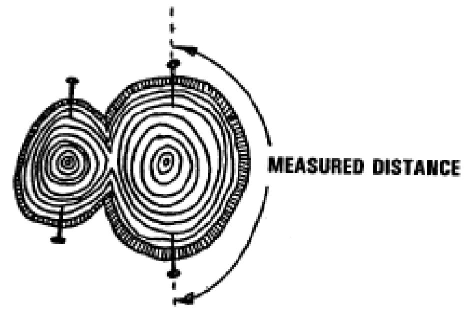


Figure 8.16: Independent trees growing together

    - If unable to use the “Double Nail Method” estimate the diameter of each, set the “DIAMETER CHECK” code to “1“, and explain the situation in TREE NOTES.

9. **Missing wood or bark**. Do not reconstruct the DBH of a tree that is missing wood or bark at the point of measurement (*Figure 8.17*). Record the diameter, to the nearest 0.1, of the wood and bark that is still attached to the tree. If a tree has a localized abnormality (gouge, depression, etc.) at the point of DBH, apply the procedure described for trees with irregularities at DBH.

10. **Live windthrown tree**: Measure from the top of the root collar along the length to 4.5 feet (Figure 8.18).

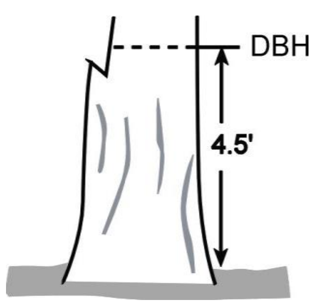


Figure 8.17: Tree with missing wood or bark.

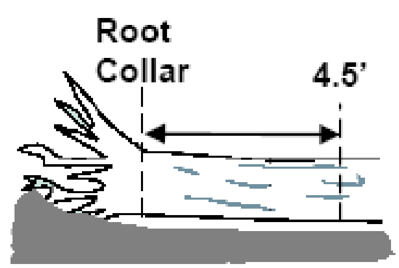


Figure 8.18: Live wind-thrown tree

11. **Down live tree with tree-form branches growing vertical from main bole**. When a down live tree, touching the ground, has vertical (<45° from vertical) tree-like branches coming off the main bole, first determine whether or not the pith of the main bole (averaged along the first log of the tree) is above or below the duff layer.

    - If the pith of the main bole is above the duff layer, use the same forking rules specified for a forked tree, and take all measurements accordingly *unless*:

        - If the pith intersection of the main down bole and vertical tree-like branch occurs below 4.5 feet from the stump along the main bole, treat that branch as a separate tree, and measure DBH 3.5 feet above the pith intersection for both the main bole and the tree-like branch *(Figure 8.19)*.

        - If the intersection between the main down bole and the tree-like branch occurs beyond the 4.5 feet point from the stump along the main bole, treat that branch as part of the main down bole *(Figure 8.20)*.

- If the pith of main tree bole is below the duff layer, ignore the

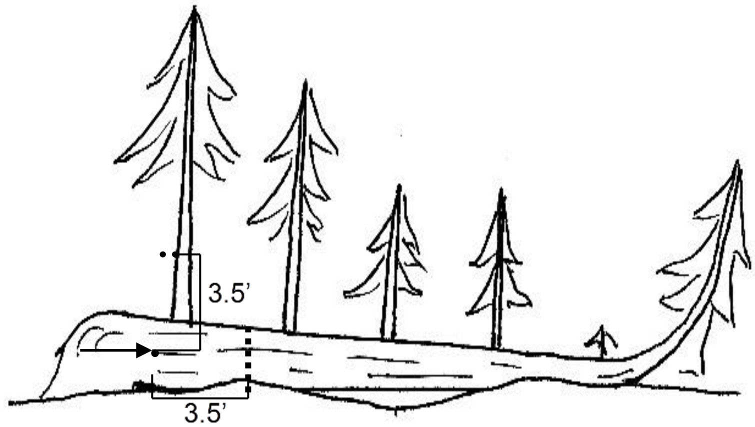


Figure 8.19: Down tree above duff

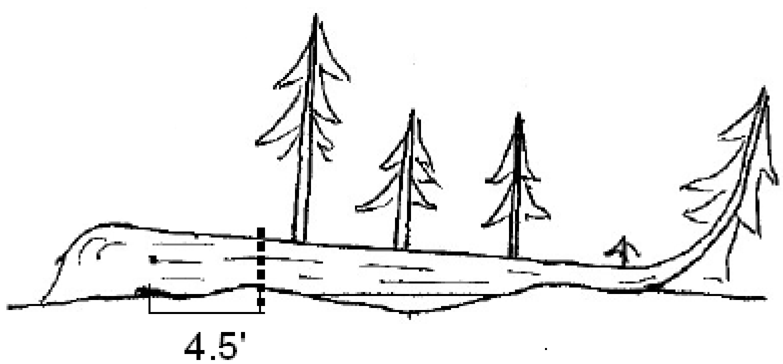


Figure 8.20: Branch beyond 4.5 feet form stump

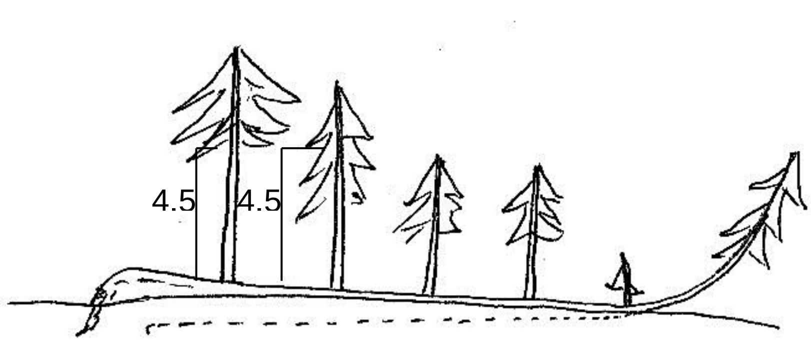


Figure 8.21: Down tree below duff

main bole, and treat each tree-like branch as a separate tree; take DBH and length measurements from the base of the tree/where the tree-like branch becomes vertical, not necessarily from the top of the down bole *(Figure 8.21).* However, if the top of the main tree bole curves out of the ground towards a vertical angle, treat that portion of that top as an individual tree originating where the pith leaves the duff layer.

12. **Tree with curved bole (pistol butt tree)**. Measure along the bole on the uphill side (upper surface) of the tree (Figure 8.22).

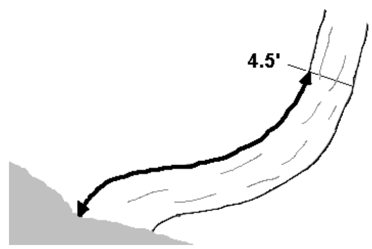


Figure 8.22: Tree with curved bole (pistol butt tree)

13. For trees with prop roots. Measure the diameter at 3.5 feet above the top of the prop root.
Note: When re-measuring Pandanus trees, it is best to avoid moving the previous DBH nails and preferable to measure DBH at the previous location if it is not obstructed by prop roots. If the previous location is obstructed by prop roots then, it's best to move the DBH nail 3.5 feet above the highest prop root.

8.5.3.1 PREVIOUS DIAMETER AT BREAST HEIGHT (CORE 5.9.1) [PREVDIA]

This is the DBH assigned at the previous inventory. It has been downloaded from the previous inventory. Any change made to this field signifies a *procedural change or an error* at the time of the previous inventory. DIAMETER CHECK should be set to 2 and an explanation is required in the notes if previous DBH is changed.

Downloaded data should be verified, and updated if one of two situations occurs:

1. The current diameter measurement point is moved to correspond with the corrected location (either procedural change or previous crew error). DIAMETER CHECK should be set to “2”; an explanation is required in the electronic TREE NOTES.
2. It is clear that there was a typo or a poorly estimated PREVIOUS DIAMETER AT BREAST HEIGHT

Estimate the new value for PREVIOUS DIAMETER AT BREAST HEIGHT by doing one of the following:

- Measure the diameter at both the correct diameter location and at the previous diameter location. Determine the difference between these two diameters. Add or subtract this value (the difference) to the downloaded value of the PREVIOUS DIAMETER. This will provide an estimate of PREVIOUS DIAMETER corresponding to the corrected location.

- Estimate the correct PREVIOUS DIAMETER based on the "best" information at hand (e.g. , the PREVIOUS DIAMETER of similar sized nearby trees of the same species).

When Collected: Downloaded when SAMPLE KIND = 2: all previous tallied trees ≥ 1.0 inch DBH
Field width: 4 digits (xxx.y)
Tolerance: N/A
Values: 001.0 to 999.9

8.5.3.2 DIAMETER AT BREAST HEIGHT (CORE 5.9.2)
[DIA]

Unless one of the special situations described in section 8.5.3 is encountered, measure DBH at 4.5 feet above the base of the tree on the uphill side of the tree. Round each measurement down to the last 0.1 inch. For example, a reading of 3.68 inches is recorded as 3.6 inches. *Note: Although stumps do not meet DBH criteria, their DIAMETERS are recorded in this data item.

When Collected: All live tally trees ≥ 1.0 in DBH and standing dead tally trees ≥ 5.0 in DBH, witness-only trees (PRESENT TREE STATUS = 1,2, or 8); and witness stumps* (PRESENT TREE STATUS = 7)

Field width: 4 digits (xxx.y)
Tolerance: +/- 0.1 in per 20.0 in increment of measured diameter on all live trees and dead trees with DECAY CLASS = 1, 2; +/- 1.0 in per 20.0 in increment of measured diameter on dead trees with DECAY CLASS = 3, 4, 5
Values: 001.0 to 999.9

8.5.3.3 DIAMETER CHECK (CORE 5.12)
[DIACHECK_PNWRS]

Record this code to identify the accuracy of the diameter measurement due to factors such as abnormal swellings, diseases, damage, new measurement positions, etc. that may affect use of this tree in diameter growth/change analyses. Note: If both code 2 ***and*** code 1,5,6, or 7 apply, *diameter is both estimated and moved*, use code 2 and change the PREVIOUS DIAMETER if necessary. If diameter is estimated because of moss/vine/obstruction, record an estimate of the diameter without the obstruction. Do not remove moss, lichens, or vines.

At remeasurement, the DIAMETER CHECK will be "0" if the DBH is measured at the length to diameter indicated in the historical data, regardless of whether the old nail is present or not. If diameter at the current inventory is measured at a different location than at the previous inventory, record DIAMETER CHECK = 2 and remove the d-nail(s) from the previous inventory.

Note: If either code 1 or code 2 is used, a tree-level note is required.

When Collected: All live tally trees ≥ 1.0 in DBH and standing dead tally trees ≥ 5.0 in DBH
Field width: 1 digit
Tolerance: No errors

Values:		Core Codes(office use only)
0	Diameter measured accurately.	0
1	Diameter estimated, for any reason other than moss, vines, or the double nail method.	1
2	Diameter measured at different location than previous measurement (remeasurement trees only).	2

5	Diameter estimated because of moss	1
6	Diameter estimated because of vines	1
7	Diameter estimated (double nail diameter)	1
8	Measured with the electronic relaskop	0

8.5.3.4 LENGTH TO DIAMETER MEASUREMENT POINT (CORE 5.24) [HTDMP]

This item will be populated with the previous crew's length to diameter measurement for remeasurement trees and will autopopulate to 4.5 feet for new trees. For remeasurement trees, only change the previous crew's value if the point of diameter measurement is moved, in which case diameter check should be "2." For new trees measured directly at 4.5 feet from the top of the base of the tree, leave this autopopulated number. If the diameter is not measured at 4.5 feet, update the actual length from the base of the tree, to the nearest 0.1 inch, at which the diameter was measured for each tally tree, 1.0 in DBH and larger.

When Collected: All live and dead tally trees ≥ 1.0 in DBH
Field width: 4 digits
Tolerance: +/- 0.2 feet
Values: 00.1 – 30.0 (autopopulated with 4.5 - **updatable**)

8.6 Root Measurements for Tropical Trees

Tropical trees can exhibit prop (or stilted roots), buttressed roots, and various forms of aerial rooting systems. To accurately account for the often significant biomass associated with these special root systems, please measure and note the following

8.6.1 TYPE OF ROOTING SYSTEM (PACIFIC ISLANDS) [ROOT_SYSTEM_PNWRS]

Record the type of rooting system of tally trees and snags.

When Collected: All live and standing dead tally trees ≥ 5.0 in d.b.h.
Field width: 1 digit
Tolerance: No errors
Values:

0 = Normal roots (Default)
No other root measurements are needed
1 = Prop (Stilted) roots
Record **root diameters**, **rooting height**, and **density code**
2 = Buttressed roots
Record **number of buttresses** and **rooting height**

8.6.2 NUMBER OF TREES IN SHARED ROOT SYSTEM (PACIFIC ISLANDS) [NBR_TREES_ROOT_SYSTEM_PNWRS]

Record the number of trees sharing the prop root system. If there is more than 1 tree in the same system and the root systems cannot be differentiated then each tree will get the same value for the root diameter, prop root density and rooting height. Tree volume will be divided by the number of trees in the shared system. Code 1 will be default for all trees.

When Collected: All live and standing dead tally trees ≥ 5.0 in d.b.h. with ROOTING SYSTEM = 1

Field width: 2 digits
Tolerance: No errors
Values: 01 to 99

8.6.3 ROOT DIAMTER 1 (PACIFIC ISLANDS)
[STILT_ROOT_DIA1_PNWRS]

Record the largest diameter (to the nearest foot) of the entire prop root system at ground level.

When Collected: All live and standing dead tally trees ≥ 5.0 in d.b.h. with ROOTING SYSTEM = 1
Field width: 2 digits
Tolerance: +/- 10%
Values: 01 to 99 feet

8.6.4 ROOT DIAMETER 2 (PACIFIC ISLANDS)
[STILT_ROOT_DIA2_PNWRS]

Record the diameter of the prop root system perpendicular to the largest diameter recorded above, also at ground level and to the nearest foot.

When Collected: All live and standing dead tally trees ≥ 5.0 in d.b.h. with ROOTING SYSTEM = 1
Field width: 2 digits
Tolerance: +/- 10%
Values: 01 to 99 feet

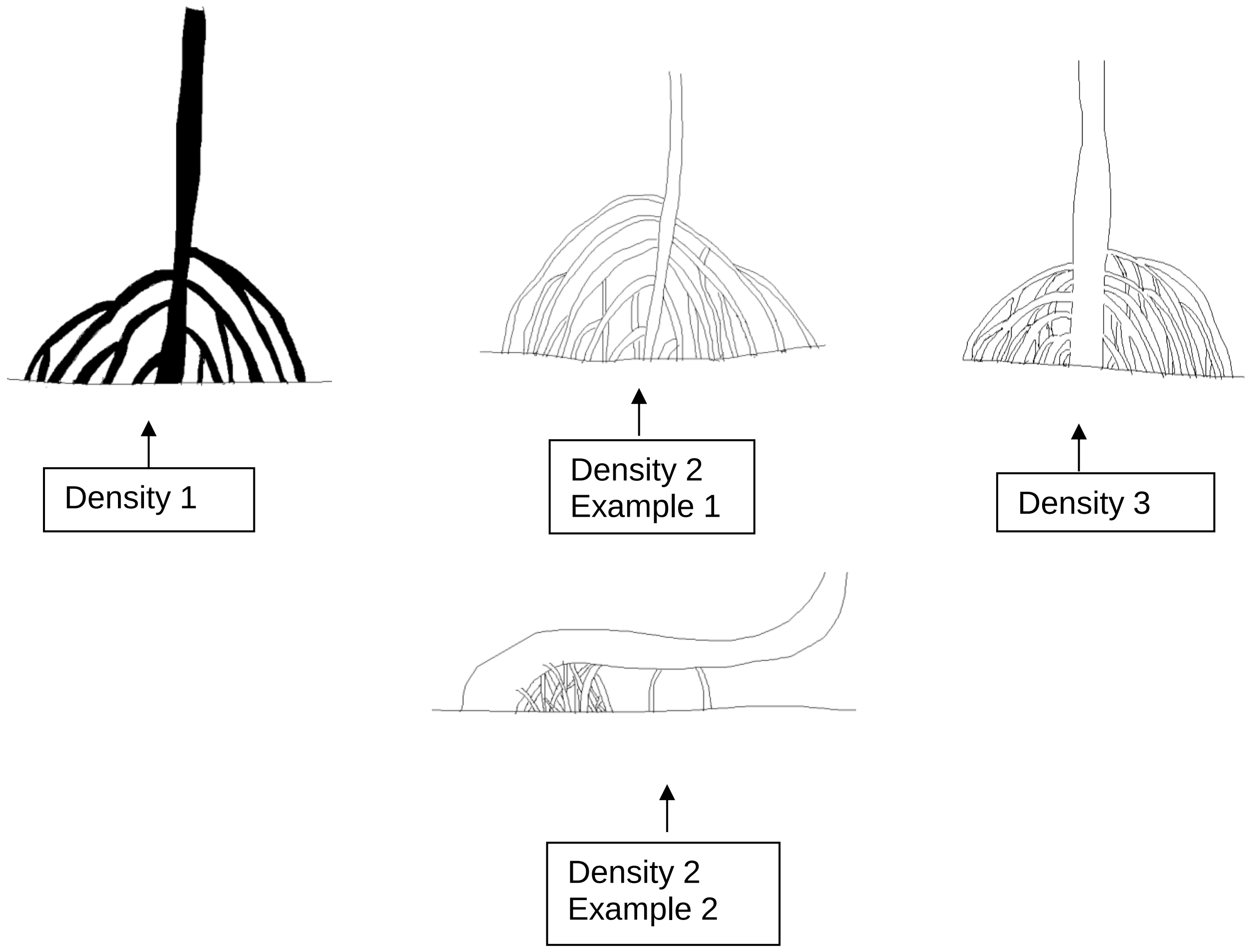
8.6.5 ROOTING HEIGHT (PACIFIC ISLANDS)
[ROOT_HT_PNWRS]

Record the height of the stilted or buttressed root system to the nearest foot, from ground level to the highest point where the stilts or buttresses protrude from the bole of the tree.

When Collected: All live and standing dead tally trees ≥ 5.0 in d.b.h with ROOTING SYSTEM = 1 or 2
Field width: 2 digits
Tolerance: +/- 10%
Values: 01 to 99 feet

8.6.6 PROP ROOT DENSITY (PACIFIC ISLANDS)
[STILT_DENSITY_PNWRS]

For prop roots, record the stilted roots figure number that best represents the density and structure of the stilted root system.



When Collected: All live and standing dead tally trees ≥ 5.0 in d.b.h. with ROOTING SYSTEM = 1
Field width: 2 digits
Tolerance: No errors
Values: 1-3 (as shown)

8.6.7 NUMBER OF BUTTRESSES (PACIFIC ISLANDS) [NO_BUTTRESSES_PNWRS]

For buttressed roots, record the number of buttresses.

When Collected: All live and standing dead tally trees ≥ 5.0 in d.b.h. with ROOTING SYSTEM = 2
Field width: 2 digits
Tolerance: +/- 2
Values: 01 to 99.

8.7 Length Measurements

8.7.1 PREVIOUS ACTUAL LENGTH (PNW)
[PREV_ACTUALHT_PNWRS]

This is the actual tree length measured by the field crew during the previous annual visit. It has been downloaded from the annual inventory and will be editable by the current field crew. These data are provided to help ensure quality of tree length data through comparison of the previous length versus the currently measured length, and to assist in estimation of current tree length, if estimation is necessary due to lean, dead top, etc.

Editing or otherwise overwriting the PREVIOUS ACTUAL LENGTH is restricted to the following scenarios:

1. Obvious error: Correct PREVIOUS ACTUAL LENGTH if error appears to be greater than twenty percent of the PREVIOUS ACTUAL LENGTH.

2. Data entry error: Correct PREVIOUS ACTUAL LENGTH if error is diagnosable as a typographical error. Any change made to this field signifies an error at the time of the previous inventory.

When Collected: When SAMPLE KIND = 2: all downloaded live tally trees ≥ 1.0 inch DBH; and standing dead tally trees ≥ 5.0 inch DBH with a measured (not estimated) ACTUAL LENGTH at the previous inventory
Field width: 3 digits
Tolerance: N/A
Values: 001 to 400

8.7.2 ACTUAL LENGTH (CORE 5.15)
[ACTUALHT]

The ACTUAL LENGTH of the tree is recorded from the base of the tree (measured from the uphill side of a tree on a slope) to the highest remaining portion of the tree still present and attached to the bole. <u>For trees with missing tops (top on live trees is completely detached; top on dead trees is greater than 50 percent detached from the tree) record the ACTUAL LENGTH until a new leader qualifies as the new top for TOTAL LENGTH; until that occurs, continue to record ACTUAL LENGTH to the break. Trees with previously broken tops are considered recovered (i.e., ACTUAL LENGTH = TOTAL LENGTH) when a new leader (dead or alive) is 1/3 the diameter of the broken top at the point where the top was broken (not where the new leader originates from the trunk).</u> Account for lean (see Figure 8.23: Measuring height of leaning tree), but not add length for crooks and sweeps. <u>Forked trees should be treated the same as unforked trees.</u>
ACTUAL LENGTH should only differ from TOTAL LENGTH if the tree has a broken of missing top.

When Collected: All live tally trees ≧1.0 in DBH and standing dead tally trees ≧ 5.0 in DBH
Field width: 3 digits
Tolerance: +/- 5 percent of true length for live trees < 60 feet
+/- 10 percent of true length for live trees ≥ 60 feet and all dead trees
Values: *001* to 400

8.7.3 PREVIOUS TOTAL LENGTH (PNW)
[PREV_HT_PNWRS]

This is the total tree length recorded by the field crew during the previous annual visit. It has been downloaded from the annual inventory and will be editable by the current field crew. These data are provided to help ensure quality of tree length data through comparison of the PREVIOUS TOTAL LENGTH to the currently measured TOTAL LENGTH, and to assist in estimation of current tree length, if estimation is necessary due to lean, dead top, etc.

Editing or otherwise overwriting the PREVIOUS TOTAL LENGTH is restricted to the following scenarios:

1. Obvious error: Correct PREVIOUS TOTAL LENGTH if error appears to be greater than twenty percent of PREVIOUS TOTAL LENGTH.
2. Data entry error: Correct PREVIOUS TOTAL LENGTH if error is diagnosable as a typographical error.

Any change made to this field signifies an error at the time of the previous inventory.

When Collected: When SAMPLE KIND = 2: all downloaded live tally trees ≥ 1.0 inch DBH; and standing dead tally trees ≥ 5.0 inch DBH with a recorded TOTAL LENGTH at the previous inventory
Field width: 3 digits
Tolerance: N/A
Values: *001* to 400

8.7.4 TOTAL LENGTH (CORE 5.14)
[HT]

Record the TOTAL LENGTH of the tree, to the nearest 1.0 foot from the base of the tree to the top of the tree. For trees growing on a slope measure on the uphill side of the tree.

If the tree has a missing top (top is broken and completely detached from the tree), estimate what the total length would be if there were no missing top. Account for lean (see Figure 8.23), but do not add length for crooks and sweeps. Forked trees should be treated the same as unforked trees.

Height on leaning trees: Measure or estimate total normally-formed bole length (from the base to the tip of the tree), and not the perpendicular from the ground to the tip. To measure heights of leaning trees using a clinometer, follow these steps:

Step 1. Move to a point along a line (point D) that is perpendicular to the plane in which the tree is leaning.

Step 2. Using a clinometer, measure the height of point A above point B.

Step 3. By standing at the base of the tree and sighting up

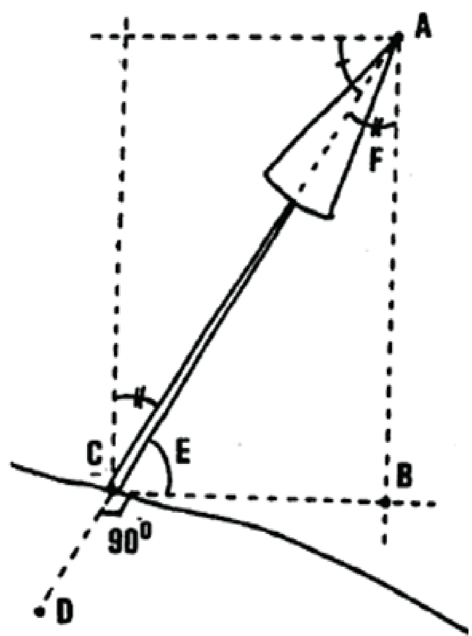


Figure 8.23: Measuring height of leaning

the bole with your clinometer, measure the slope of the bole in degrees (Angle E in the diagram above).

Step 4. Subtract the degrees of lean (step 3) from
90 degrees. This gives you the degrees of angle F.

Step 5. By sighting through your clinometer, convert the angle calculated in step 4 to a percentage.

Step 6. Use the slope correction table in Appendix 7 to determine the expansion factor for the percent slope determined in step 5. Multiply the expansion factor by the measured distance from point A to point B (step 2). This gives the length of the bole (point A to point C).

When Collected: All live tally trees ≧ 1.0 *inch* DBH and all standing dead tally trees ≧ 5.0 *inch* DBH
Field width: 3 digits
Tolerance: +/- 10 % of true length
Values: *001* to 400

8.7.5 LENGTH METHOD (CORE 5.16)
[HTCD]

Record the code that indicates the method used to determine tree lengths.

When Collected: All live tally trees ≥ 1.0 in DBH and all standing dead tally trees ≥ 5.0 in DBH
Field width: 1 digit
Tolerance: No errors
Values:

1 Total and actual lengths are field measured with a measurement instrument (e.g., clinometer, relaskop, tape)
2 Total length is visually estimated, actual length is measured with an instrument.
3 Total and actual lengths are visually estimated.

8.7.6 PREVIOUS LENGTH METHOD (PNW)
[PREV_HTCD_PNWRS]

Downloaded code indicating the method used to determine tree length at the previous visit. This field cannot be updated by the field crew.

When Collected: All live tally trees ≥ 1.0 in DBH and all standing dead tally trees ≥ 5.0 in DBH
Field width: 1 digit
Tolerance: No errors
Values:
1 Total and actual lengths are field measured with a measurement instrument (e.g., clinometer, relaskop, tape)
2 Total length is visually estimated, actual length is measured with an instrument.
3 Total and actual lengths are visually estimated.

8.8 CENTROID/SECOND DIAMETER (PACIFIC ISLANDS)

8.8.1 LENGTH TO CENTROID DIAMETER (PACIFIC ISLANDS)

[CENTROID_DIA_HT_PNWRS]

The length from the base of the tree to the point where a second stem diameter is measured, which is the point at 30% of the TOTAL LENGTH of the stem (rounded to the nearest 0.5 foot up to 19 feet TOTAL LENGTH, and to the nearest 1.0 foot if greater than or equal to 20 feet TOTAL LENGTH). This field is calculated by the data recorder after TOTAL LENGTH is entered and cannot be updated. Exceptions: For tree ferns (SPCD = 6545, 6546, 6547, 6548, 6549), this field is blank.

When Collected: All live and standing dead tally trees ≥ 5.0 in DBH,
except SPCD = 6545, 6546, 6547, 6548, and 6549
Field width: 4 digits (xxx.y)
Tolerance: N/A
Values: 001.0 to 999.0 (autopopulated – not updatable)

8.8.2 ACTUAL LENGTH TO CENTROID DIAMETER (PACIFIC ISLANDS)

[ACTUAL_CENTROID_DIA_HT_PNWRS]

The length from the base of the tree to the point where a second stem diameter is actually measured; usually equal to 30% of the TOTAL LENGTH of the tree stem. This field is calculated by the data recorder after TOTAL LENGTH is entered *but can be updated* if abnormalities in the stem prevent a normal diameter measurement. Update ACTUAL LENGTH TO CENTROID DIAMETER if diameter is measured at different height. On trees with diameter irregularities (swellings, bumps, depressions, and branches), measure immediately above or below the irregularity at the place it ceases to affect normal stem form.

Do not adjust the ACTUAL LENGTH TO CENTROID DIAMETER by more than the following amount:

LENGTH TO CENTROID DIAMETER	
Up to 6 feet	+/- 1/2 foot
7 to 12 feet	+/- 1 foot
13 to 18 feet	+/- 2 feet
19 to 24 feet	+/- 3 feet
25 to 30 feet	+/- 4 feet
More than 30 feet	+/- 5 feet

Exceptions: For tree ferns (SPCD = 6546, 6547, 6545, 6548, 6549), measure the height to where the fronds emerge from the trunk. For all trees, if 30% of total length is greater than the actual length of the tree, measure the actual length to centroid diameter at the point where the break begins to influence the centroid diameter.

When Collected: All live and standing dead tally trees ≥ 5.0 in DBH
Field width: 4 digits (xxx.y)

Tolerance:	LENGTH TO CENTROID DIAMETER
+/- 1/2 foot	Up to 6 feet
+/- 1 foot	7 to 12 feet
+/- 2 feet	13 to 18 feet
+/- 3 feet	19 to 24 feet
+/- 4 feet	25 to 30 feet
+/- 5 feet	More than 30 feet

Values: 001.0 to 999.0 (autopopulated – updatable)

8.8.3 CENTROID DIAMETER ON UPPER BOLE (PACIFIC ISLANDS) [CENTROID_DIA_PNWRS]

Measure and record the diameter at the ACTUAL LENGTH TO CENTROID location. For trees with a TOTAL LENGTH of up to 19 feet, record to the nearest 0.1 of an inch. For trees with a TOTAL LENGTH of 20 feet or more, record to the nearest 0.5 of an inch. Exception: For tree ferns (SPCD = 6546, 6547, 6545, 6548, 6549), measure the diameter where the fronds emerge from the trunk.

When Collected: All live and standing dead tally trees ≥ 5.0 in DBH where actual length ≥ length to centroid diameter
Field width: 4 digits (xxx.y)
Tolerance: +/- 0.1 inches for trees with up to 6 feet LENGTH TO CENTROID DIAMETER
+/- 1 inches for trees with 7 feet LENGTH TO CENTROID DIAMETER or more
Values: 001.0 to 999.9

8.8.4 PREVIOUS SECOND DIAMETER ON UPPER BOLE (PACIFIC ISLANDS) [PREV_UPPER_DIA_PNWRS]

This is the second diameter measured on the upper bole during the previous inventory. It has been downloaded from the previous inventory and will not be updatable. This data is provided to help ensure the quality of the second diameter data through comparison.

When Collected: When SAMPLE KIND = 2: all downloaded live and standing dead tally trees ≥ 5.0 inches in DBH
Field width: 3 digits
Tolerance: N/A
Values: 004 to 999

8.8.5 SECOND DIAMETER ON UPPER BOLE (PACIFIC ISLANDS) [UPPER_DIA_PNWRS]

Record the diameter of the main stem on the upper bole at the PREVIOUS LENGTH TO SECOND DIAMETER. The upper bole diameter should have been measured with a relaskop at the point where the main stem tapers to 4 inches or greater. If the current actual length is less than the previous length to second diameter than this variable will not be remeasured. Measure to the nearest inch for all trees ≥ 5.0 inches DBH on the 24-foot radius subplots.

When Collected: All remeasured live and standing dead tally trees ≥ 5.0 inches DBH
Field width: 3 digits
Tolerance: +/- 2 inches
Values: 004 to 999

8.8.6 PREVIOUS LENGTH TO SECOND DIAMETER (PACIFIC ISLANDS) [PREV_UPPER_DIA_HT_PNWRS]

This is the length to the second diameter measured during the previous inventory. It has been downloaded from the previous inventory and will not be updatable.

When Collected: When SAMPLE KIND = 2: all downloaded live and standing dead tally trees ≥ 5.0 inches in DBH
Field width: 3 digits
Tolerance: N/A
Values: 005 to 400

8.9 UNCOMPACTED LIVE CROWN RATIO (CORE 5.18) [UNCRCD]

Record the UNCOMPACTED LIVE CROWN RATIO to the nearest one percent. UNCOMPACTED LIVE CROWN RATIO is the percentage of actual tree length supporting live foliage (or in cases of extreme defoliation should be supporting live foliage) that is effectively contributing to tree growth. UNCOMPACTED LIVE CROWN RATIO is determined by the ratio of live crown length to ACTUAL LENGTH (figure 8.24). Live crown length is determined from the last live foliage at the crown top (dieback in the upper portion of the crown is not part of the live crown) to the “base of live crown”. Many times there are additional live branches below the “base of live crown”. These branches are only included if they have a basal diameter greater than 1 inch and are within 5 feet of the base of the obvious live crown. The live crown base becomes that point on the main bole perpendicular to the lowest live foliage on the last branch that is included in the live crown. The live crown base is determined by the live foliage and not by the point where a branch intersects with the main bole.

When Collected: All live tally trees ≥ 1.0 in DBH
Field width: 2 digits
Tolerance: +/- 10 %
Values: 00 to 99

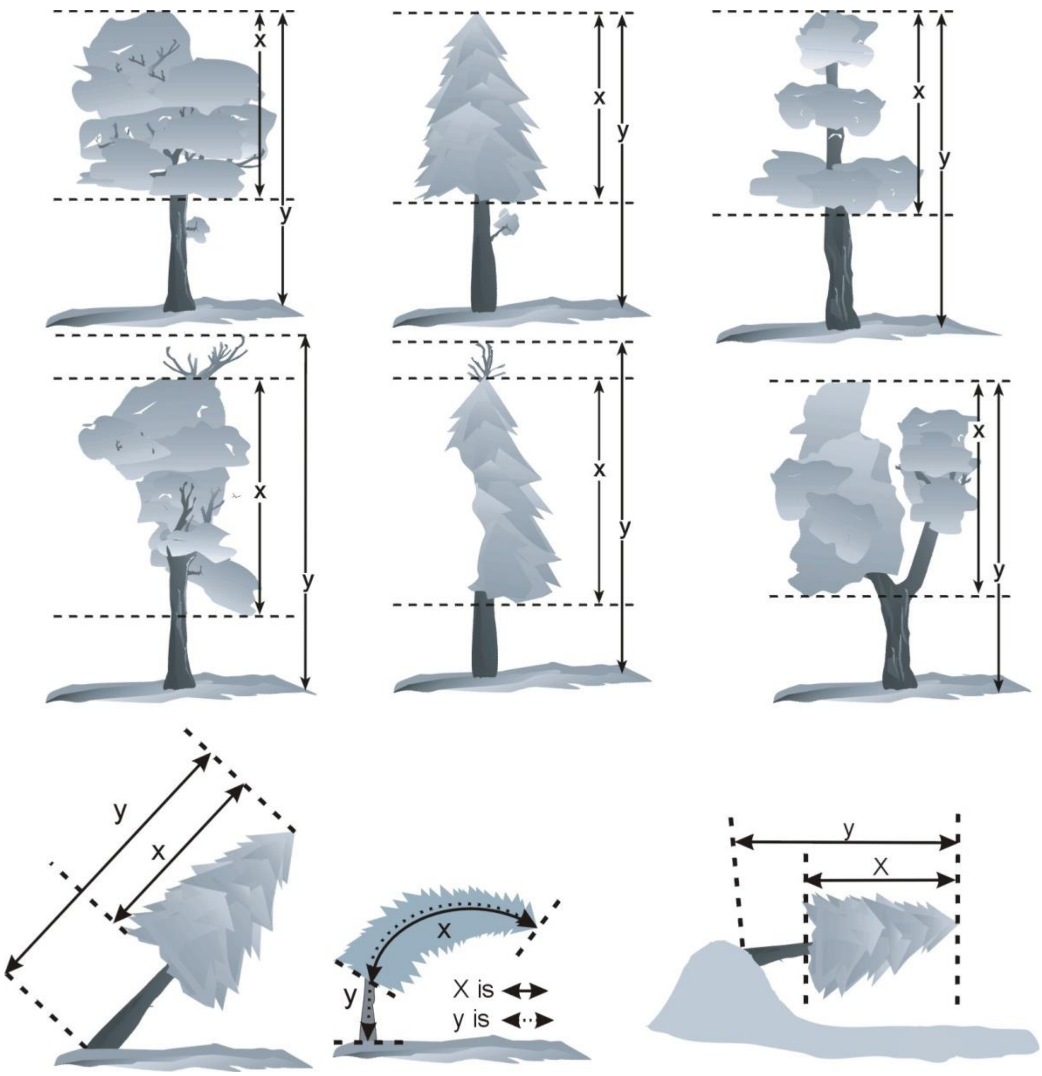


Figure 8.24: UNCOMPACTED LIVE CROWN RATIO examples**.**

<u>Determine sapling UNCOMPACTED LIVE CROWN RATIO by dividing the live crown length by ACTUAL LENGTH. Live crown length is the distance between the top live foliage (dieback and dead branches are not included) and the lowest live twig for saplings. The live crown base for saplings is different from trees 5.0 inches DBH and larger; the 1-inch/5-foot rule does not apply in this case. Do not include sprigs or leaves on the main stem below the lowest live twig (figure 8.25).</u>

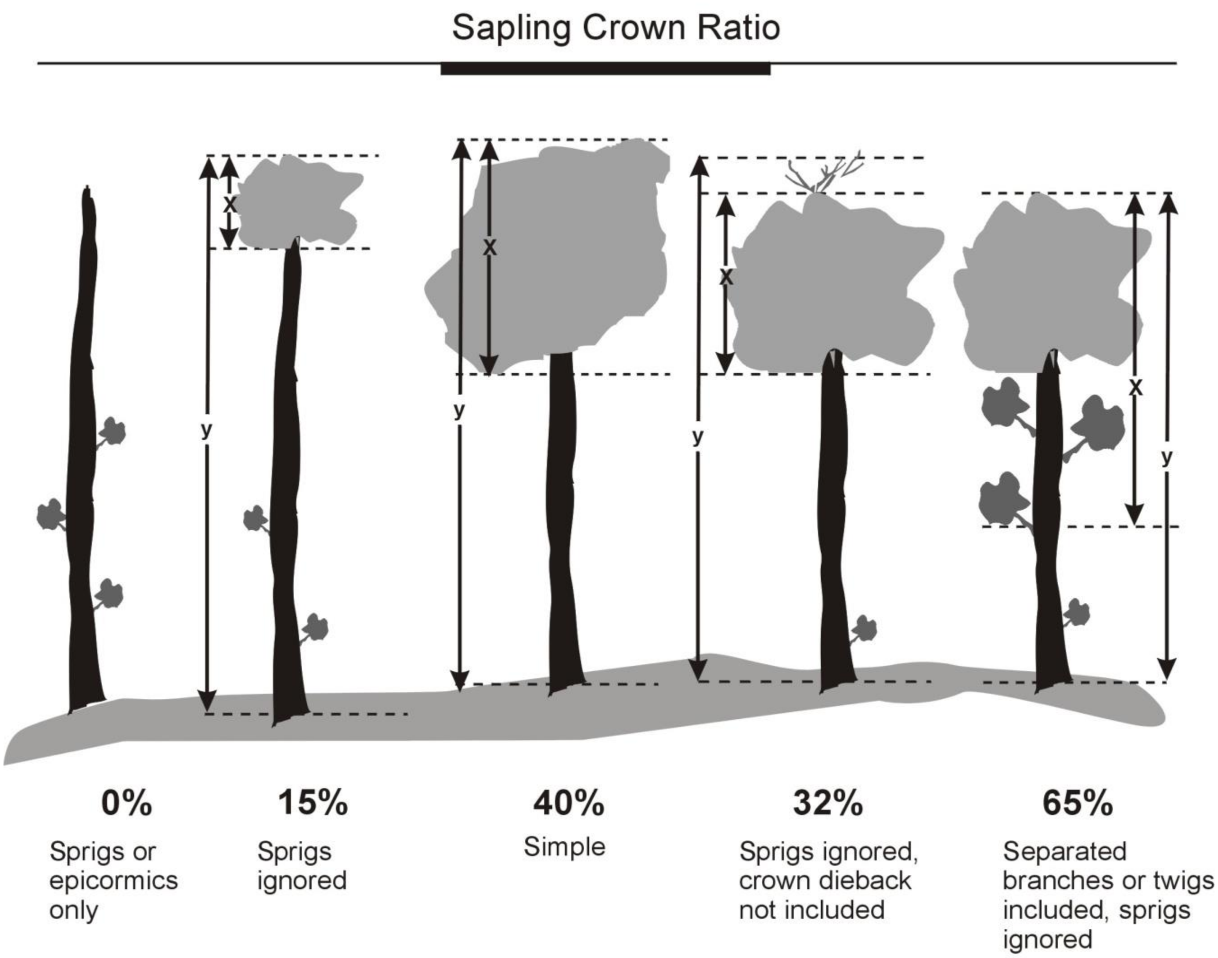


Figure 8.25: Sapling ratio determination examples

8.10 COMPACTED CROWN RATIO (CORE 5.19) [CR]

Record the COMPACTED CROWN RATIO for each live tally tree, 1.0 inch and larger, to the nearest one percent. COMPACTED CROWN RATIO is that portion of the tree supporting live foliage (or in the case of extreme defoliation should be supporting live foliage) and is expressed as a percentage of the actual tree length. To determine COMPACTED CROWN RATIO, ocularly transfer lower live branches to fill in large holes in the upper portion of the tree until a full, even crown is visualized.

Do not over-compact trees beyond their typical full crown situation. For example, if tree branches tend to average 2 feet between whorls, do not compact crowns any tighter than the 2-foot spacing (figure 8.26). Figure 8.29 shows an example of COMPACTED CROWN RATIO on a leaning tree.

When Collected: All live tally trees ≥ 1.0 in DBH
Field width: 2 digits
Tolerance: +/- 10 %
Values: 00 to 99

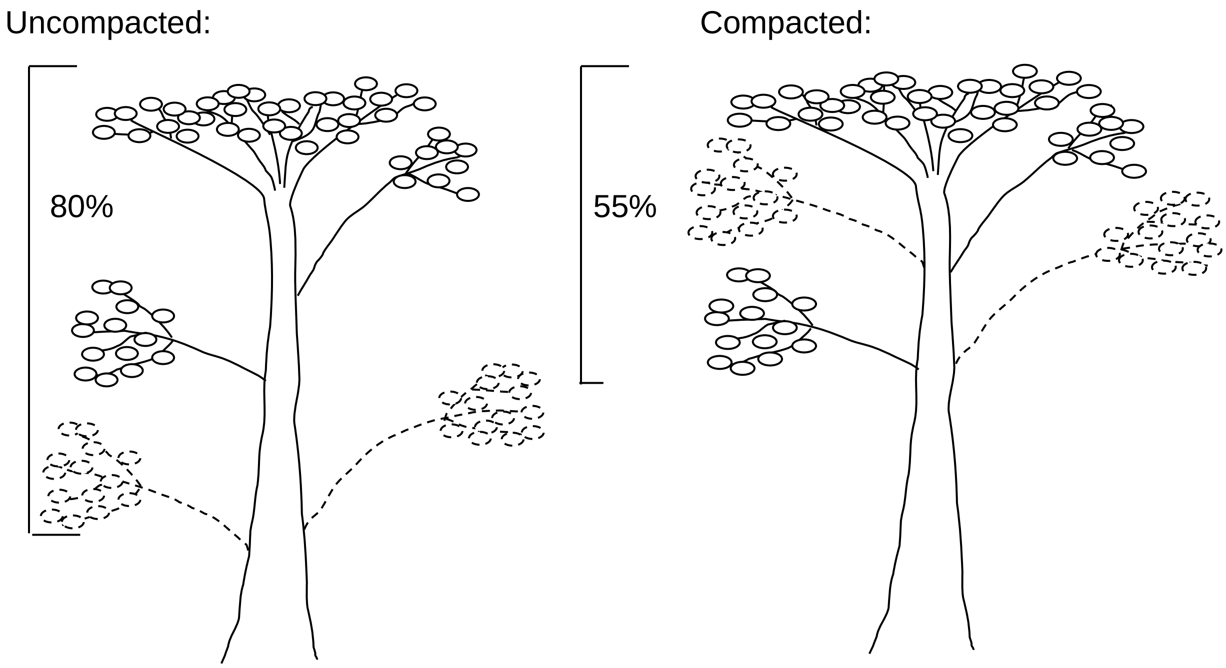


Figure 8.26: Example of Crown Ratio on Open-crown tree (e.g., Terminalia catappa)

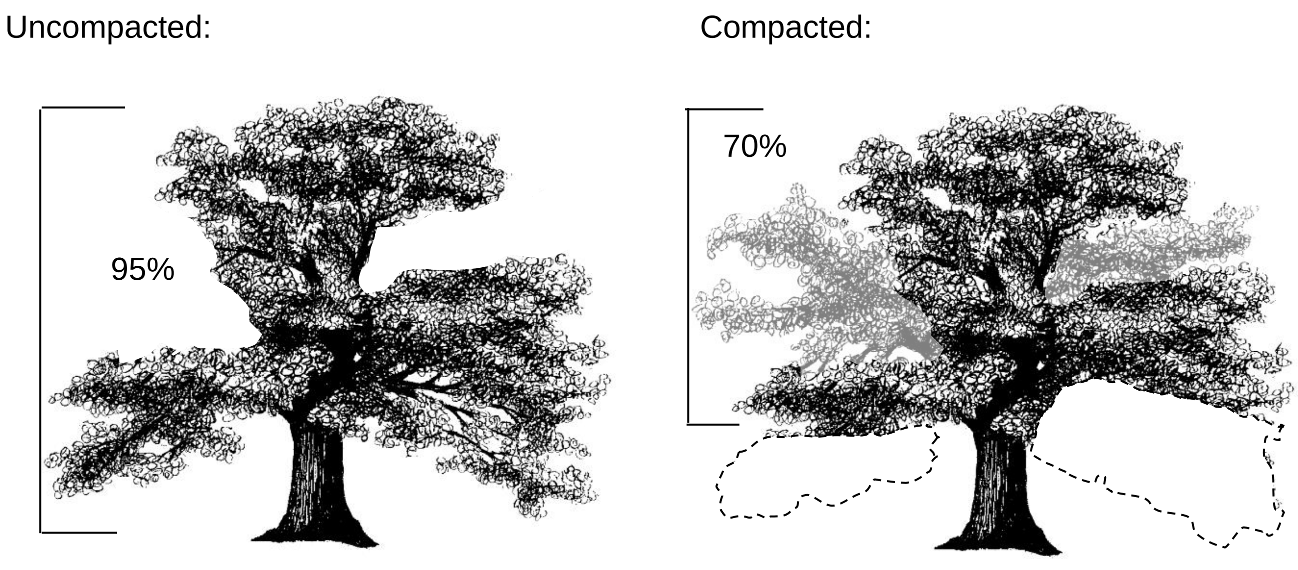


Figure 8.27: Example of Crown Ratio on Dense-crown tree (e.g., Mangifera indica)

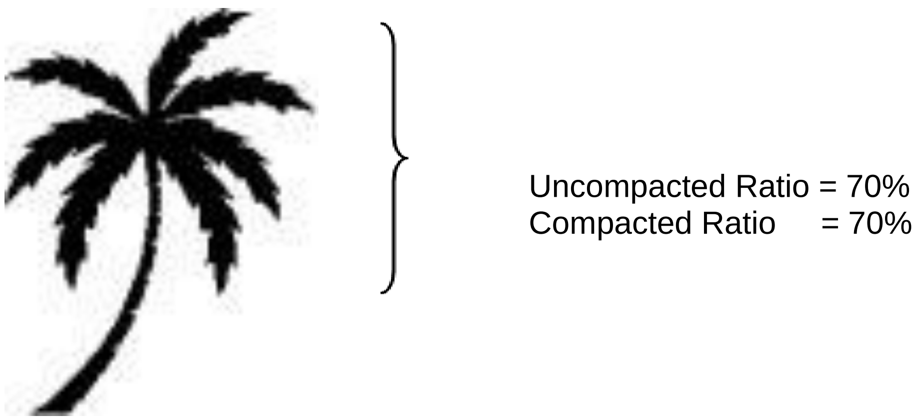


Figure 8.28: Compacted and Uncompacted crown ratios will be the same for tree ferns and palm trees except when fronds or large parts of fronds are missing.

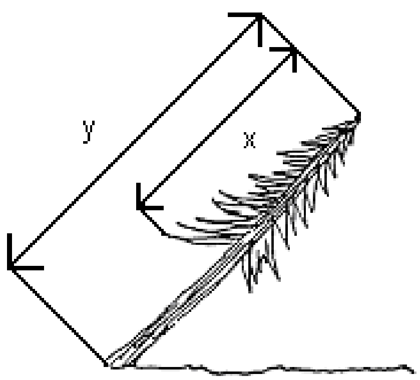


Figure 8.29: Compacted crown ratio on a leaning tree. Compacted crown ratio = (x/y) 100.

8.11 CROWN CLASS (CORE 5.17)

[CCLCD]

<u>Rate tree crowns in relation to the sunlight received and proximity to neighboring trees (Figure 8.30). Base the assessment on the position of the crown at the time of observation. Example: a formerly suppressed tree which is now dominant due to tree removal is classified as dominant.</u>

When Collected: All live tally trees ≥ 1.0 in DBH
Field width: 1 digit
Tolerance: No errors

Values:

1 Open Grown: Trees with crowns that received full light from above and from all sides throughout most of its life, particularly during its early developmental period.

2 Dominant: Trees with crown extending above the general level of the crown canopy and receiving full light from above and partly from the sides. These trees are taller than the average trees in the stand and their crowns are well developed, but they could be somewhat crowded on the sides. Also, trees whose crowns have received full light from above and from all sides during early development and most of their life. Their crown form or shape appears to be free of influence from neighboring trees.

3 Co-dominant: Trees with crowns at the general level of the crown canopy. Crowns receive full light from above but little direct sunlight penetrates their sides. Usually they have medium-sized crowns and are somewhat crowded from the sides. In stagnated stands, co-dominant trees have small-sized crowns and are crowded on the sides.

4 Intermediate: Trees that are shorter than dominants and co-dominant, but their crowns extend into the canopy of co-dominant and dominant trees. They receive little direct light from above and none from the sides. As a result, intermediates usually have small crowns and are very crowded from the sides.

5 Overtopped: Trees with crowns entirely below the general level of the crown canopy that receive no direct sunlight either from above or the sides.

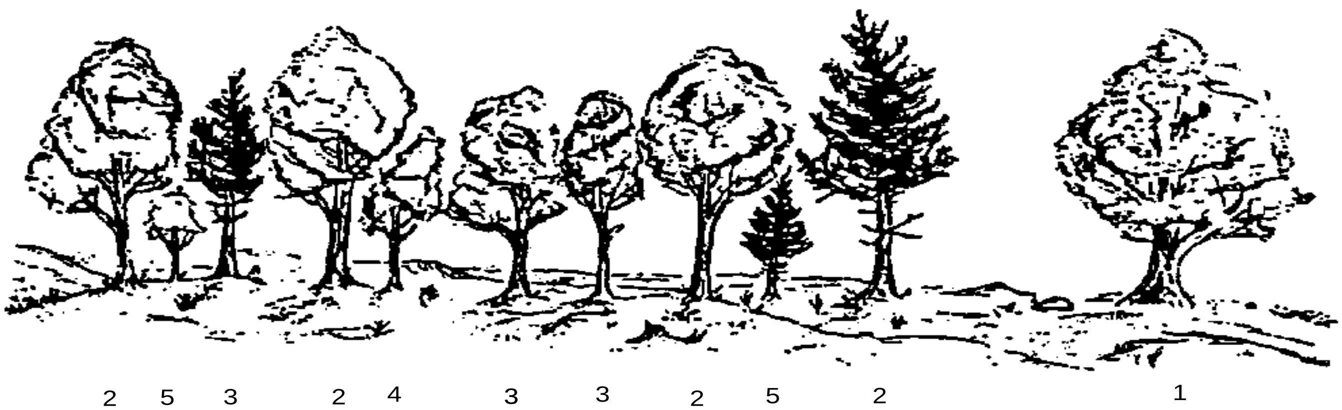
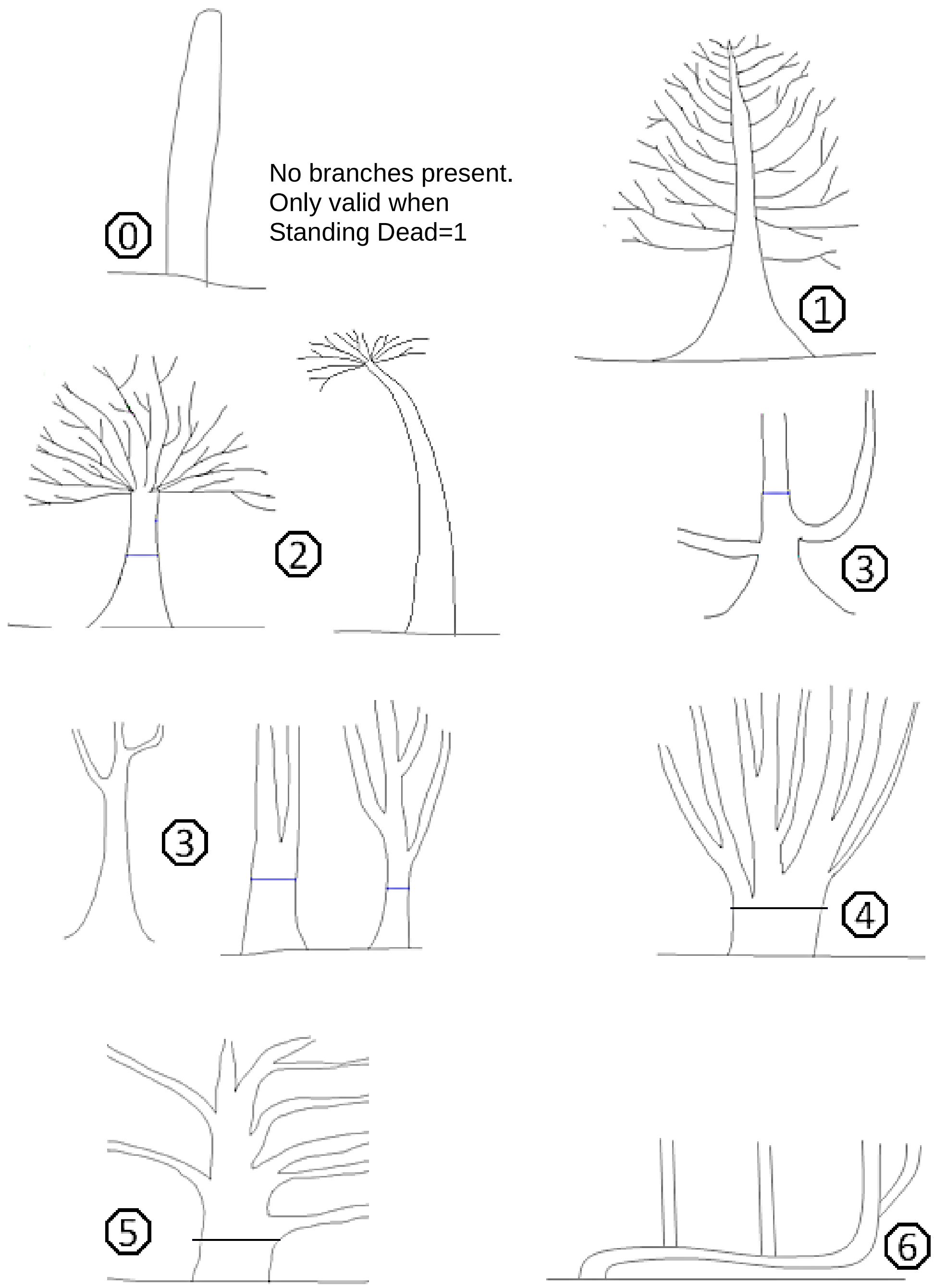


Figure 8.30: Examples of CROWN CLASS code definitions

8.12 BRANCHING CHARACTERISTICS (PACIFIC ISLANDS) [BRANCH_FORM_PNWRS]

Record the branching form figure number that best represents the density and structure of the branching system.

When Collected: All live and standing dead tally trees ≥ 5.0 in d.b.h.
Field width: 1 digit
Tolerance: No errors
Values: 0-6 (as shown)

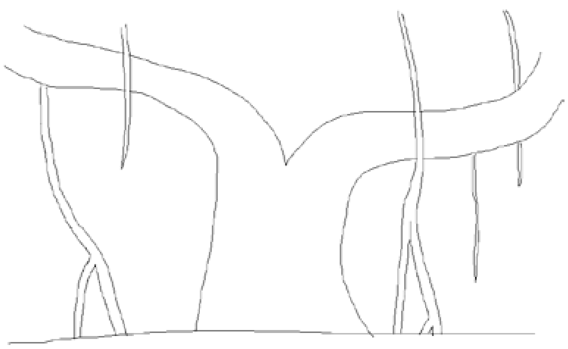

0
No branches present.
Only valid when
Standing Dead=1
1
2
3
3
4
5
6

8.13 AERIAL ROOT DENSITY (PACIFIC ISLANDS)

[AERIAL_ROOTS_PNWRS]

If there are aerial roots, record the aerial root figure number that best represents the density and branching structure of the aerial root system. If there are no aerial roots, record 0 for this column.

When Collected: All live and standing dead tally trees ≥ 5.0 in d.b.h.
Field width: 1 digit
Tolerance: No errors
Values: 0 (no aerial roots) and 1 to 3(as shown below)



Aerial roots = 1

Aerial roots = 2

Aerial roots = 3

8.14 TREE DAMAGE

Record up to two different damages per tree. Record damage for all saplings and trees at least 1.0 in DBH. Damage is characterized according to four attributes: location of damage, type of damage, severity of damage, and damaging agent. Damages must meet severity thresholds (defined in section 8.10.3, DAMAGE SEVERITY) in order to be recorded.

The tree is observed from all sides starting at the roots. Damage signs and symptoms are prioritized and recorded based on location in the following order: roots, roots and lower bole, lower bole, lower and upper bole, upper bole, crownstem, and branches recorded as DAMAGE LOCATION 1-9, or record location code 0 (for no damage).

Within any given location, the hierarchy of damage follows the numeric order of DAMAGE TYPE possible for that location. The numeric order denotes decreasing significance as the code number goes up, i.e., DAMAGE TYPE 01 is more significant than DAMAGE TYPE 25. A maximum of two damages are recorded for each tree. If a tree has more than two damages that meet the threshold levels, the first two that are observed starting at the roots are recorded.

When multiple damages occur in the same place, the most damaging is recorded. For example, if a canker, DAMAGE TYPE 02, meets the threshold and has a conk growing in it, record only the canker. Another example: if an open wound meets threshold and also has resinosis, record only the open wound.

Damage Summary

If a live tally tree with a DBH of 1 inch or greater has damage, you must code 4 items;

1. DAMAGE LOCATION
2. DAMAGE TYPE
3. DAMAGE SEVERITY
4. DAMAGE AGENT

A. Does the tree have DAMAGE in these locations?

1 = Roots (exposed) and Stump (12 in. in height from ground level)
2 = Roots, stump, and lower bole

Then valid DAMAGE TYPE codes are**:**

01. Canker, gall (>20% circumference)
    Valid SEVERITY codes = 2 through 9
02. Conks, advanced decay, ROT
    Valid SEVERITY codes = 0
03. Open wounds (>20% circumference)
    Valid SEVERITY codes = 2 through 9
04. Resin flowing from bole (>20% circumference)
    Valid SEVERITY codes = 2 through 9
05. Cracks and seams
    Valid SEVERITY codes = 0
11. Broken bole or broken roots within 3 feet of the stump
    Valid SEVERITY codes = 0
12. Brooms on roots or bole
    Valid SEVERITY codes = 0
13. Broken or dead roots beyond 3 feet of the bole (>20% of roots broken or dead)

Valid SEVERITY codes = 2 through 9

31. Other

Valid SEVERITY codes = 0

B. Does the tree have DAMAGE in these locations?

3 = Lower Bole (lower half of the trunk between stump and base of live crown

4 = Lower and Upper Bole

5 = Upper Bole (upper half of trunk between stump and base of live crown

Then valid DAMAGE TYPE codes are:

1. Canker, gall (>20% circumference)
   Valid SEVERITY codes = 2 through 9
2. Conks, advanced decay, ROT
   Valid SEVERITY codes = 0
3. Open wounds (>20% circumference)
   Valid SEVERITY codes = 2 through 9
4. Resin flowing from bole (>20% circumference)
   Valid SEVERITY codes = 2 through 9
5. Cracks and seams
   Valid SEVERITY codes = 0
11. Broken bole or broken roots within 3 feet of the stump
    Valid SEVERITY codes = 0
12. Brooms on roots or bole
    Valid SEVERITY codes = 0
31. Other
    Valid SEVERITY codes = 0

C. Does the tree have DAMAGE in these locations?

6 = Crownstem (main stem within the live crown area, above the base of the live crown

Then valid DAMAGE TYPE codes are:

1. Canker, gall (>20% circumference)
   Valid SEVERITY codes = 2 through 9
2. Conks, advanced decay, ROT
   Valid SEVERITY codes = 0
3. Open wounds (>20% circumference)
   Valid SEVERITY codes = 2 through 9
4. Resin flowing from bole (>20% circumference)
   Valid SEVERITY codes = 2 through 9
5. Cracks and seams
   Valid SEVERITY codes = 0
21. Loss of apical dominance, dead terminal (broken or dead top)

Valid SEVERITY codes = 0 through 9

31. Other

Valid SEVERITY codes = 0

D. Does the tree have DAMAGE in these locations?

7 = Branches > 1 inch where the branch attaches to the main
bole or crown stem

Then valid DAMAGE TYPE codes are:

1. Canker, gall (>20% circumference)
   Valid SEVERITY codes = 2 through 9
2. Conks, advanced decay, ROT
   Valid SEVERITY codes = 0
3. Open wounds (>20% circumference)
   Valid SEVERITY codes = 2 through 9
4. Resin flowing from bole (>20% circumference)
   Valid SEVERITY codes = 2 through 9
5. Cracks and seams
   Valid SEVERITY codes = 0

20. Vines in the crown (>20% of crown affected)
    Valid SEVERITY codes = 2 through 9
22. Broken or dead (>20% of branches affected in the live crown area)
    Valid SEVERITY codes = 2 through 9
23. Excessive branching or brooms (>20% of branches affected)
    Valid SEVERITY codes = 2 through 9
31. Other
    Valid SEVERITY codes = 0

E. Does the tree have DAMAGE in these locations?

8 = Buds and Shoots (the most recent year's growth)

Then valid DAMAGE TYPE codes are:

24. Damaged buds, shoots, or foliage (>30% of buds and shoots damaged > 50%)
    Valid SEVERITY codes = 3 through 9
31. Other
    Valid SEVERITY codes = 0

F. Does the tree have DAMAGE in these locations?
9 = Foliage

Then valid DAMAGE TYPE codes are:

24. Damaged buds, shoots, or foliage (>30% of buds and shoots damaged > 50%)
    Valid SEVERITY codes = 3 through 9
25. Discoloration of foliage (>30% of foliage discolored > 50%)

Valid SEVERITY codes = 3 through 9

31. Other

Valid SEVERITY codes = 0

Valid Damage agent codes for all damages:

10 Insects
20 Disease
30 Fire
40 Animal
47 Wild Pigs
50 Weather
60 Vegetation (suppression, competition, vines/mile-a-minute, etc.)
70 Unknown/not sure/other – includes death from human activity not related to silvicultural and landclearing activity (accidental, random, etc) (include notes)
80 Silvicultural or landclearing activity (death caused by harvesting or other silvicultural activity, including girdling, chaning, etc., or to landclearing activity)
90 Physical (hit by falling tree, rockslides, etc.)

8.14.1 DAMAGE LOCATION 1 (CORE 5.20.1)
[DAMLOC1]

Record the location on the tree where DAMAGE TYPE 1 is found (figure 8.32). If the same damage continues into two or more locations, record the appropriate code, or if the combination of locations does not exist (damage extends from crownstem to roots), record the lowest location that best describes the damage (see figure 8.31). Multiple damages may occur in the same location, but record the higher priority damage (lower code number) first. If the damages are coincident (a conk within a canker), record only the higher priority damage.

The “base of the live crown” is defined as the horizontal line which would touch the lowest part of the foliage, excluding branches towards the base of the tree which are less than 1.0 inch or more than 5 feet from the rest of the crown. See Section 8.7 (UNCOMPACTED LIVE CROWN RATIO) for more details.

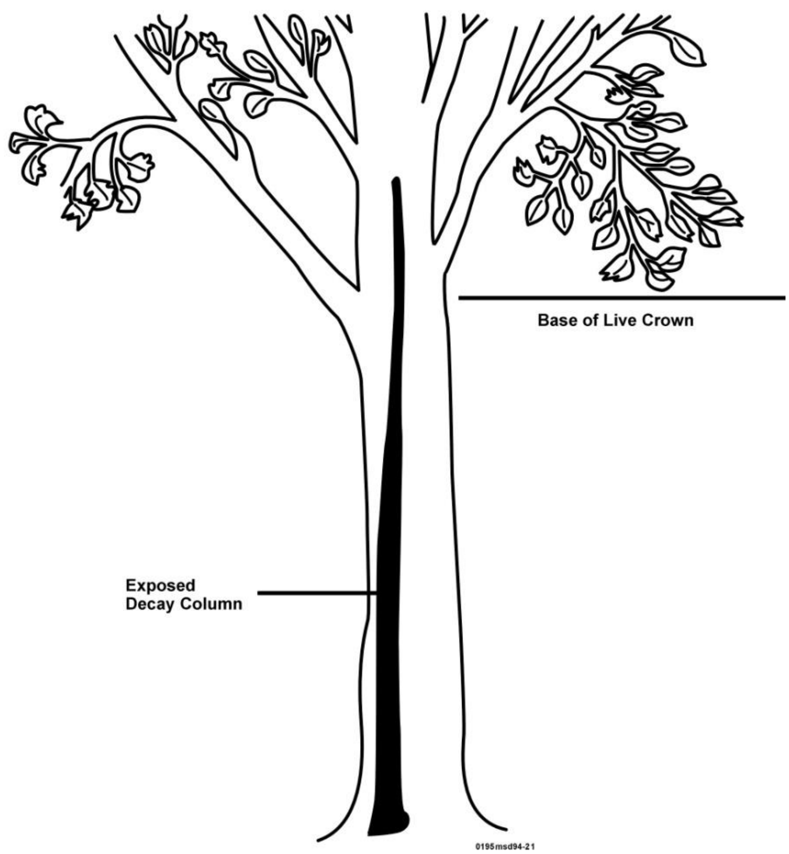


Figure 8.31: The damage runs from stump to crownstem. Code here should be 02 (roots and "stump" and lower bole) which represents the lowest locations of this multi-location damage.

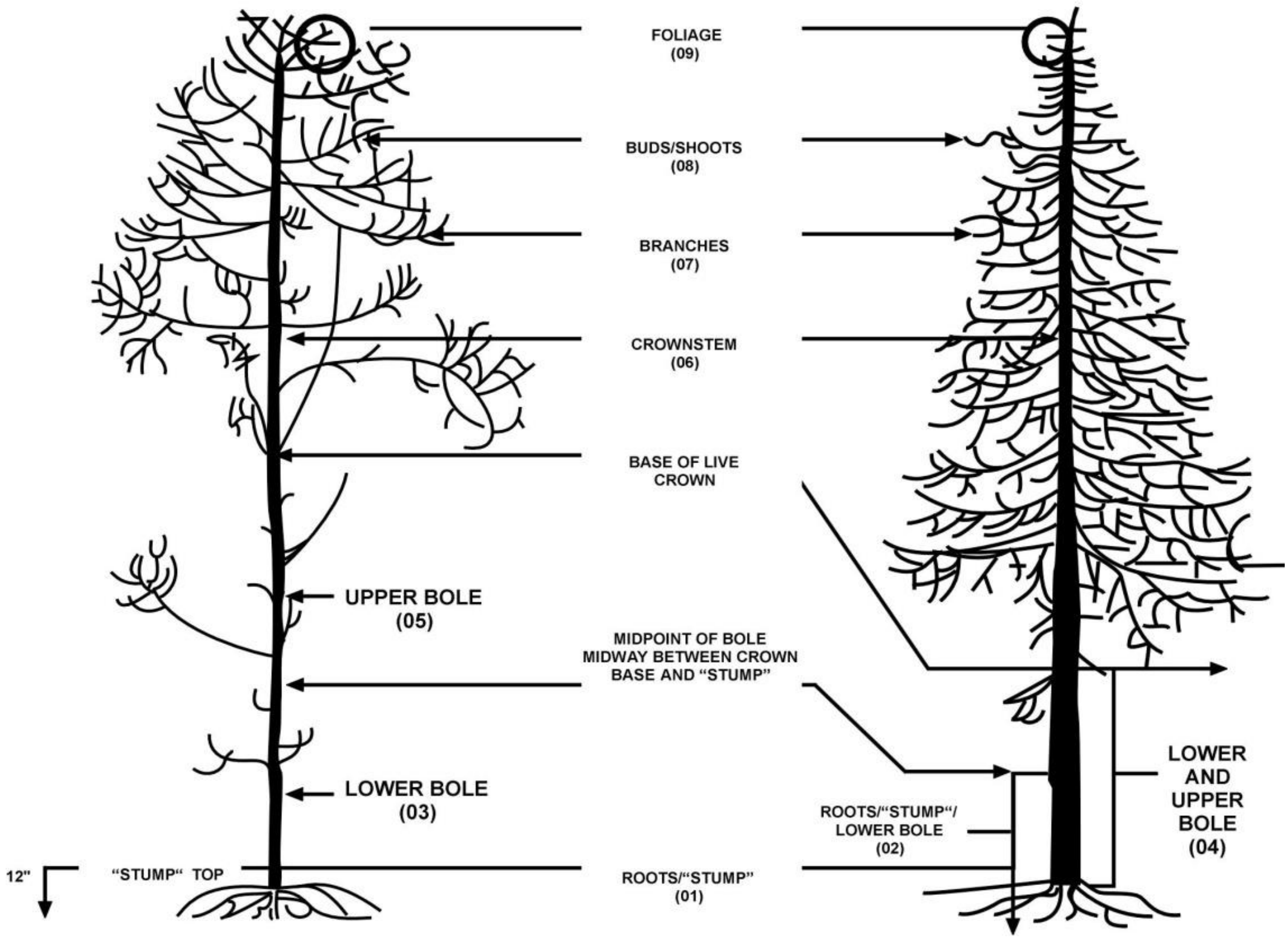


Figure 8.32: Location codes for damage

When Collected: All live tally trees ≥ 1.0 in DBH
Field width: 1 digit
Tolerance: +/- 1 location class
Values:

0	No damage
1	Roots (exposed) and stump (12 inches in height from ground level)
2	Roots, stump, and lower bole
3	Lower bole (lower half of the trunk between the stump and base of the live crown)
4	Lower and upper bole
5	Upper bole (upper half of the trunk between stump and base of the live crown)
6	Crownstem (main stem within the live crown area, above the base of the live crown)
7	Branches (>1 in at the point of attachment to the main crown stem within the live crown area)
8	Buds and shoots (the most recent year's growth)
9	Foliage

8.14.2 DAMAGE TYPE 1 (CORE 5.20.2)
[DAMTYP1]

Record the first damage type observed that meets the damage threshold definition in the lowest location. Damage categories are recorded based on the numeric order that denotes decreasing significance from damage 01 - 31.

When Collected: All tally trees where DAMAGE LOCATION 1 > 0
Field width: 2 digits
Tolerance: No errors
Values:

1 Canker, gall: Cankers may be caused by various agents but are most often caused by fungi. The bark and cambium are killed, and this is followed by death of the underlying wood, although the causal agent may or may not penetrate the wood. This results in areas of dead tissue that become deeper and wider, or galling (including galls caused by rusts), on roots, bole, or branches. Due to the difficulty in distinguishing some abnormal swellings (e.g., burls) from classic galls and cankers, all are recorded as damage 01. A canker may be:

Annual (enlarges only once and does so within an interval briefer than the growth cycle of the tree, usually less than one year),

Diffuse (enlarges without characteristic shape or noticeable callus formation at margins), or

Perennial (enlarges during more than one year - often has a target appearance).

2 Conks, fruiting bodies, and signs of advanced decay: Fruiting bodies on the main bole, crownstem, and at the point of the branch attachment are signs of decay. "Punky wood" is a sign of decay and is evidenced by soft, often moist, and degraded tissue.

Cavities into the main bole that are oriented in such a way that they act as catchment basins for water are signs of decay. Bird cavities are signs of decay.

Rotten branches or branches with conks **are not indicators of decay unless** the threshold is met (>20% of branches are affected).

Rotting stumps associated with coppice regeneration (e.g., northern pin oak, maple) are excluded from coding.

3 Open wounds: An opening or series of openings where bark has been removed or the inner wood has been exposed and no signs of advanced decay are present. Improper pruning wounds that cut into the wood of the main stem are coded as open wounds, if they meet the threshold; those which leave the main stemwood intact are excluded.

4 Resinosis or gummosis: The origin of areas of resin or gum (sap) exudation on branches and trunks.

5 Cracks and seams: Cracks in trees are separations along the radial plane greater than or equal to 5 ft. When they break out to the surface they often are called frost cracks. These cracks are not caused by frost or freezing temperature, though frost can be a major factor in their continued development. Cracks are most often caused by basal wounds or sprout stubs, and expand when temperatures drop rapidly. Seams develop as the tree attempts to seal the crack, although trees have no mechanism to compartmentalize this injury.

Lightning strikes are recorded as cracks when they do not meet the threshold for open wounds.

11 Broken bole or roots (less than 3 feet from bole): Broken roots within 3 feet from bole either from excavation or rootsprung for any reason. For example, those which have been excavated in a road cut or by animals.

Stem broken in the bole area (below the base of the live crown) and tree is still alive.

12 Brooms on roots or bole: Clustering of foliage about a common point on the trunk. Examples include ash yellows witches' brooms on white and green ash and eastern and western conifers infected with dwarf mistletoes.

13 Broken or dead roots (beyond 3 feet): Roots beyond 3 feet from bole that are broken or dead.

20 Vines in the crown: Kudzu, grapevine, ivy, dodder, etc. smothers tree crowns. Vines are rated as a percentage of tree crown affected.

21 Loss of apical dominance, dead terminal: Mortality of the terminal of the crownstem caused by frost, insect, pathogen, or other causes.

22 Broken or dead: Branches that are broken or dead. Branches with no twigs are ignored and not coded as dead. Dead or broken branches attached to the bole or crownstem outside the live crown area are not coded. 20% of the main, first order portion of a branch must be broken for a branch to be coded as such.

23 Excessive branching or brooms within the live crown area: Brooms are a dense clustering of twigs or branches arising from a common point that occur within the live crown area. Includes abnormal clustering of vegetative structures and organs. This includes witches' brooms caused by ash yellows on green and white ash and those caused by dwarf mistletoes.

24 Damaged buds, foliage or shoots: Insect feeding, shredded or distorted foliage, buds or shoots >50% affected, on at least 30% of foliage, buds or shoots. Also includes herbicide or frost-damaged foliage, buds or shoots.

25 Discoloration of foliage: At least 30% of the foliage is more than 50% affected. Affected foliage must be more of some color other than green. If the observer is unsure if the color is green, it is considered green and not discolored.

31 Other: Use when no other explanation is appropriate. Specify in the tree notes section. Code 31 is used to maintain consistency with the Phase 3 crown damage protocols.

Legal Combinations of DAMAGE TYPE by DAMAGE LOCATION:

For each of the following location codes, possible damage codes and damage definitions are presented. Minimum damage thresholds are described in Section 8.10.3, DAMAGE SEVERITY.

Location 1: Roots and stump
- 01 Canker, gall -- exceeds 20% of circumference of stump
- 02 Conks, fruiting bodies, and signs of advanced decay -- any occurrence
- 03 Open wounds -- exceeds 20% of circumference of stump
- 04 Resinosis or gummosis -- origin of flow width exceeds 20% of circumference of stump
- 05 Cracks and seams -- any occurrence
- 11 Broken bole or roots less than 3 feet from bole -- any occurrence
- 12 Brooms on roots or bole -- any occurrence.
- 13 Broken or dead roots -- exceeds 20% of roots, beyond 3 feet from bole, broken or dead
- 31 Other

Location 2: Roots, stump, and lower bole
- 01 Canker, gall -- exceeds 20% of circumference of stump
- 02 Conks, fruiting bodies, and signs of advanced decay -- any occurrence
- 03 Open wounds – exceeds 20% at the point of occurrence, or for the portion in root zone, 20% of the circumference of stump

04 Resinosis or gummosis -- origin of flow width exceeds 20% at the point of occurrence, or for the portion in root zone, 20% of circumference of stump.
05 Cracks and seams - any occurrence
11 Broken bole or roots less than 3 feet from bole -- any occurrence
12 Brooms on roots or bole - -any occurrence.
13 Broken or dead roots -- exceeds 20% of roots, beyond 3 feet from bole, broken or dead
31 Other

Location 3: Lower bole
01 Canker, gall -- exceeds 20% of circumference at the point of occurrence
02 Conks, fruiting bodies, and signs of advanced decay -- any occurrence
03 Open wounds -- exceeds 20% of circumference at the point of occurrence
04 Resinosis or gummosis -- origin of flow width exceeds 20% of circumference at the point of occurrence
05 Cracks and seams -- any occurrence
11 Broken bole or roots less than 3 feet from bole -- any occurrence
12 Brooms on roots or bole -- any occurrence
31 Other

Location 4: Lower and upper bole -- same as lower bole.

Location 5: Upper bole - same as lower bole.

Location 6: Crownstem
01 Canker, gall -- exceeds 20% of circumference of crownstem at the point of occurrence
02 Conks, fruiting bodies, and signs of advanced decay -- any occurrence
03 Open wounds - exceeds 20% of circumference at the point of occurrence -- any occurrence
04 Resinosis or gummosis -- origin of flow width exceeds 20% of circumference at the point of occurrence
05 Cracks and seams -- all woody locations -- any occurrence.
21 Loss of apical dominance, dead terminal -- any occurrence
31 Other

Location 7: Branches >1 in at the point of attachment to the main or crown stem
01 Canker, gall -- exceeds 20% of circumference on at least 20% of branches
02 Conks, fruiting bodies and signs of advanced decay -- more than 20% of branches affected
03 Open wounds -- exceeds 20% of circumference at the point of occurrence on at least 20% of branches
04 Resinosis or gummosis -- origin of flow width exceeds 20% of circumference at the point of occurrence on at least 20% of branches
05 Cracks and seams -- all occurrences, and on at least 20% of branches
20 Vines in the crown -- more than 20% of live crown affected
22 Broken or dead -- more than 20% of branches affected within the live crown area, except for woodland species where there is no requirement that damage to branches can only occur to branches that originate within the live crown area.
23 Excessive branching or brooms -- more than 20% of branches affected
31 Other

Location 8: Buds and shoots
24 Damaged buds, shoots or foliage - more than 30% of buds and shoots damaged more than 50%.
31 Other.

Location 9: Foliage
24 Damaged buds, shoots or foliage - more than 30% of foliage damaged more than 50%.
25 Discoloration of foliage - more than 30% of foliage discolored more than 50%.
31 Other.

8.14.3 DAMAGE SEVERITY 1 (CORE 5.20.3) [DAMSEV1]

Record a code to indicate the amount of affected area (above threshold) in DAMAGE LOCATION 1 recorded for TREE DAMAGE 1. Severity codes vary depending on the type of damage recorded.

When Collected: All tally trees where DAMAGE LOCATION 1 > 0
Field width: 1 digit
Tolerance: +/- 1 valid class unless otherwise defined by the DAMAGE TYPE
Values: The codes and procedures for SEVERITY 1 values are defined for each DAMAGE TYPE 1.

DAMAGE TYPE Code 01 -- Canker, gall

Measure the affected area from the margins (outer edges) of the canker or gall within any 3-ft vertical section in which at least 20% of circumference is affected at the point of occurrence. For location 7, and location 1, 20% of branches and roots beyond 3 ft, respectively, must be affected, then record in 10% classes. See Figure 8.33.

Severity classes for code 01 (percent of circumference affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

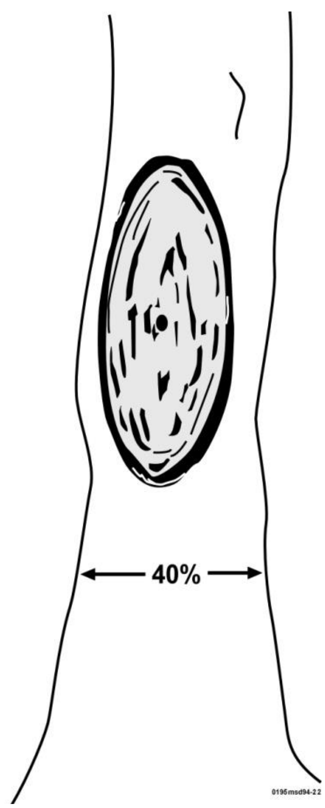


Figure 8.33: A canker which exceeds threshold. Since 40% of circumference is visible from any side, and since over half the visible side is taken up by the canker, it obviously exceeds the 20% minimum circumference threshold.

DAMAGE TYPE Code 02 -- Conks, fruiting bodies, and signs of advanced decay

Severity classes for code 02: **None**. Enter code 0 regardless of severity, except for roots > 3 ft from the bole, or number of branches affected - 20%

DAMAGE TYPE Code 03 -- Open wounds

The damaged area is measured at the widest point between the margins of the exposed wood within any 3-ft vertical section in which at least 20% of the circumference is affected at the point of occurrence. For location 7, and location 1, 20% of branches and roots beyond 3 ft, respectively, must be affected, then record in 10% classes. See Figure 8.34.

Severity Classes for code 03 (percent of circumference affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

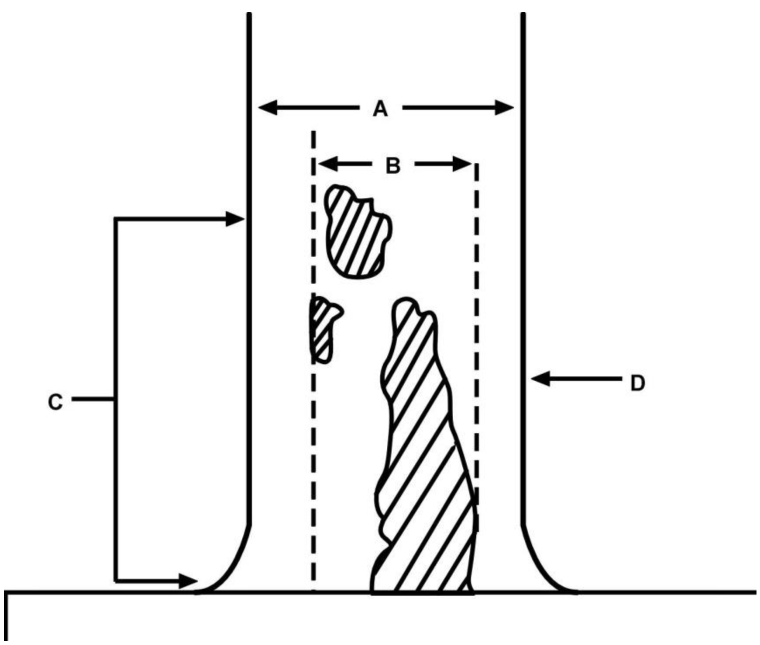


Figure 8.34: Multiple damage in "stump" and lower bole. A=approximately 40% of tree circumference; B=portion of tree circumference affected by damage; C=vertical distance within one meter; D=midpoint of occurence at which circumference is measured.

DAMAGE TYPE Code 04 -- Resinosis or gummosis

Resinosis or gummosis is measured at the widest point of the origin of the flow width in which at least 20% of the circumference is affected at the point of occurrence.   For location 7, and location 1, 20% of branches and roots beyond 3 ft, respectively, must be affected, then record in 10% classes.

Severity classes for code 04 (percent of circumference affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 05 -- Cracks and seams greater than or equal to 5 ft

Severity class for code 05 -- Record "0" for the lowest location in which the crack occurs. For location 7, and location 1, 20% of branches and roots beyond 3 ft, respectively, must be affected, then record in 10% classes.

DAMAGE TYPE Code 11 -- Broken bole or roots less than 3 ft from bole

Severity classes for code 11: None. Enter code 0 regardless of severity.

DAMAGE TYPE Code 12 -- Brooms on roots or bole

Severity classes for code 12: None. Enter code 0 regardless of severity.

DAMAGE TYPE Code 13 -- Broken or dead roots

At least 20% of roots beyond 3 ft from bole that are broken or dead.

Severity classes for code 13 (percent of roots affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 20 -- Vines in crown

Severity classes for code 20 (percent of live crown affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 21 -- Loss of apical dominance, dead terminal

Any occurrence (> 1%) is recorded in 10% classes as a percent of the crownstem affected. Use trees of the same species and general DBH class in the area or look for the detached portion of the crownstem on the ground to aid in estimating percent affected. If a lateral branch has assumed the leader and is above where the previous terminal was, then no damage is recorded.

Severity classes for code 21:

Classes	Code
01-09	0
10-19	1
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 22 -- Broken or dead branches (> 1in above the swelling at the point of attachment to the main or crown stem within the live crown area)

At least 20% of branches are broken or dead.

Severity classes for code 22 (percent of branches affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 23 -- Excessive branching or brooms

At least 20% of crownstem or branches affected with excessive branching or brooms.

Severity classes for code 23 (percent of area affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 24 - Damaged buds, shoots or foliage

At least 30% of the buds, shoots or foliage (i.e., chewed or distorted) are more than 50% affected.

Severity classes for code 24:

Classes	Code
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 25 - Discoloration of Foliage

At least 30% of the foliage is more than 50% affected.

Severity classes for code 25 (percent affected):

Classes	Code
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 31 -- Other

Severity classes for code 31:

None. Enter code 0 regardless of severity. Describe condition in tree notes. Examples are shown in Figures 8.35-8.41.

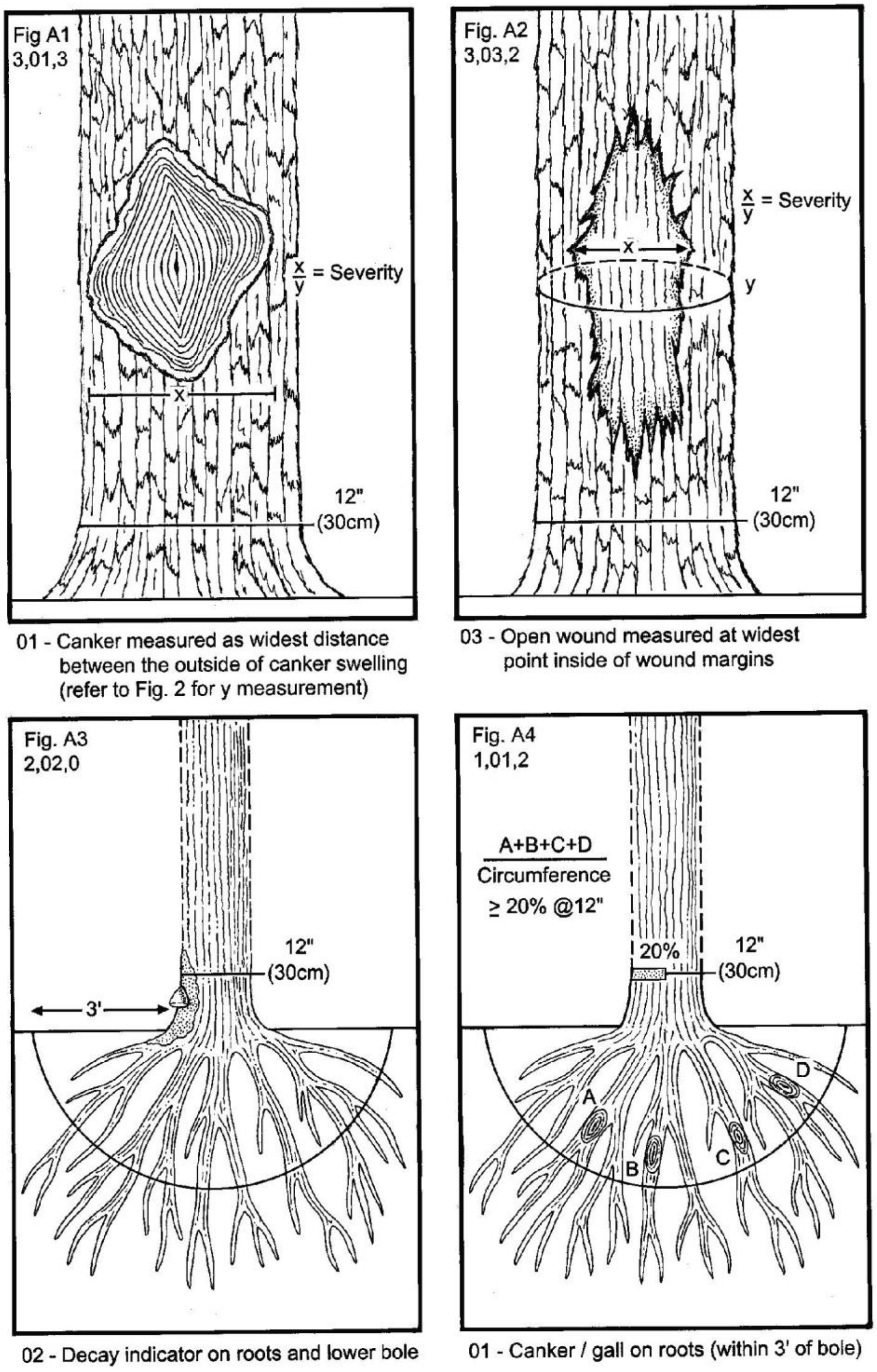
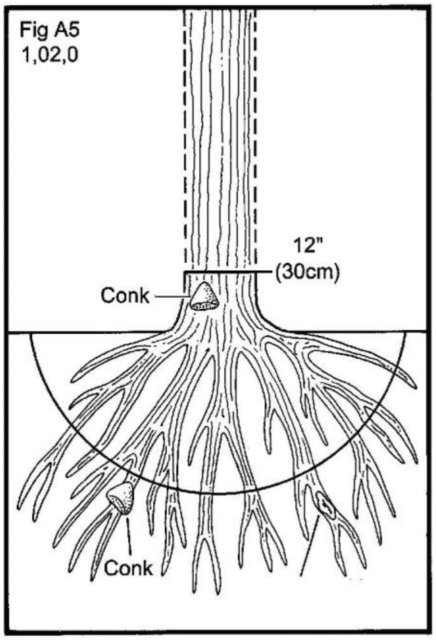
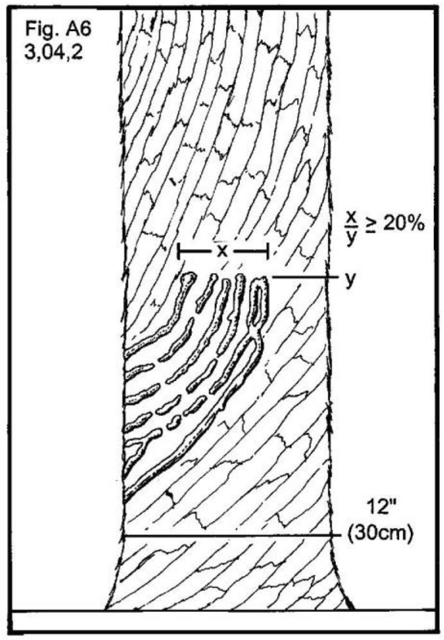


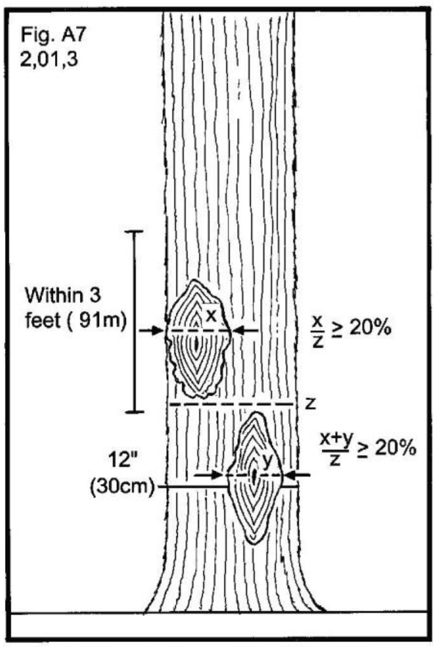
Figure 8.35: Examples of damage coding.



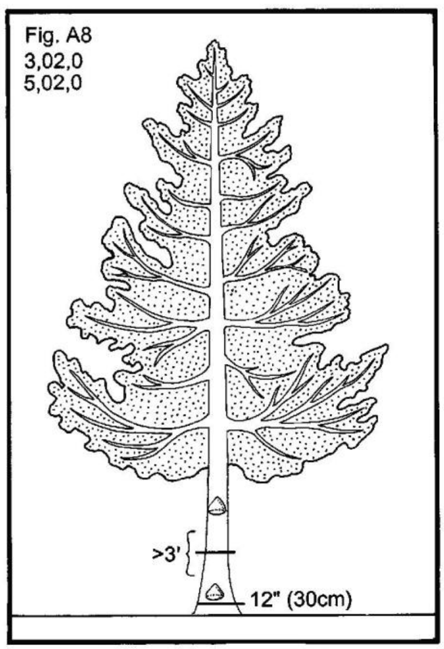
02 - Indicator of decay within 3' of bole. Beyond 3" of bole, indicators must affect ≥ 20% of roots (see fig. 12)



04 - Origin of resinosis in lower bole

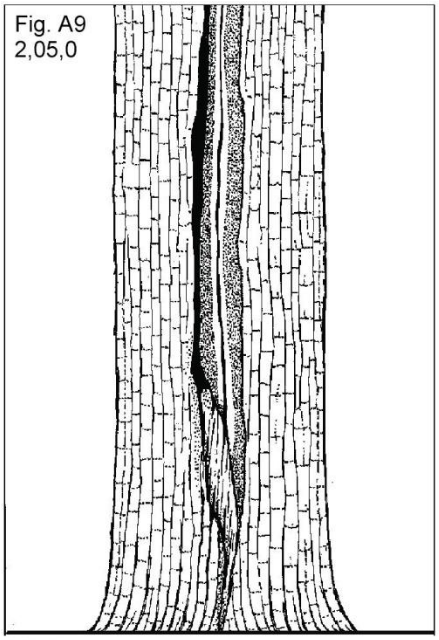


01 - Additive cankers within 3' in roots and lower bole

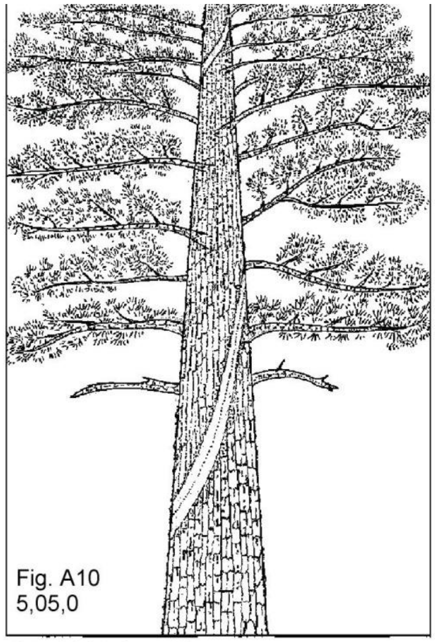


02 - Conks separated by >3'; 2 damages

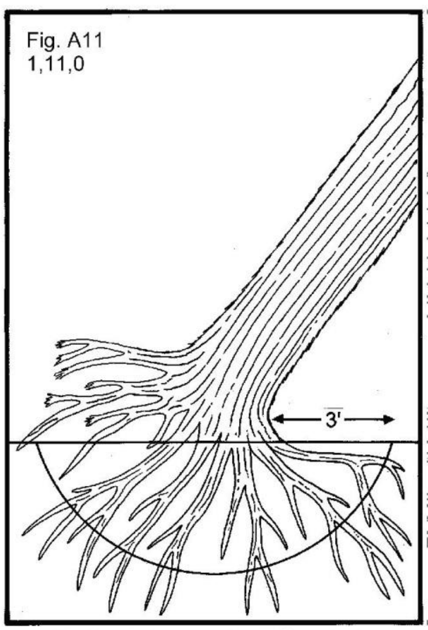
Figure 8.36: Examples of damage coding.



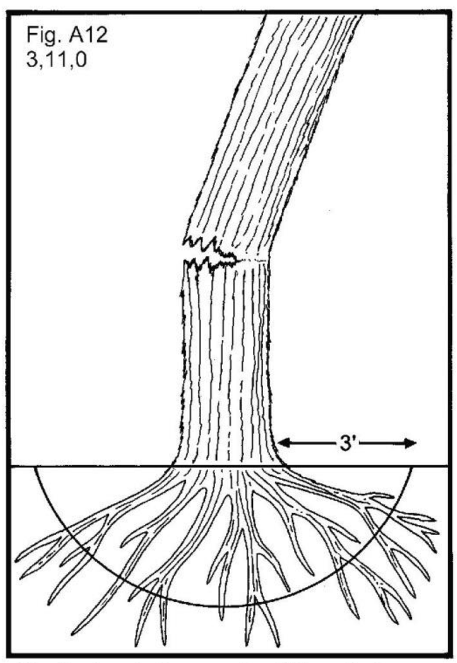
05- Cracks and seams



05 - Lightning strike

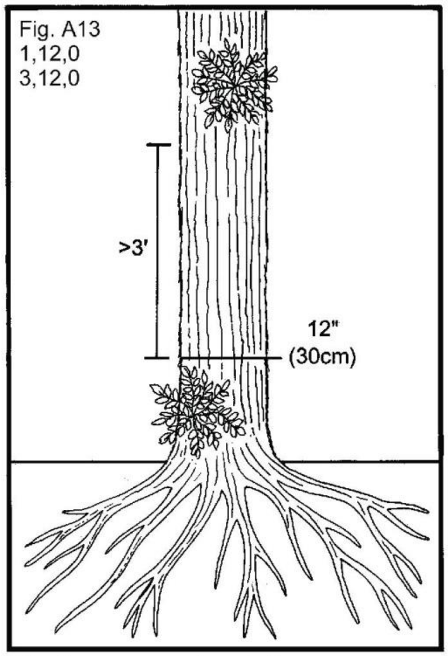


11 - Broken bole or roots <3' from bole, broken roots must be visible

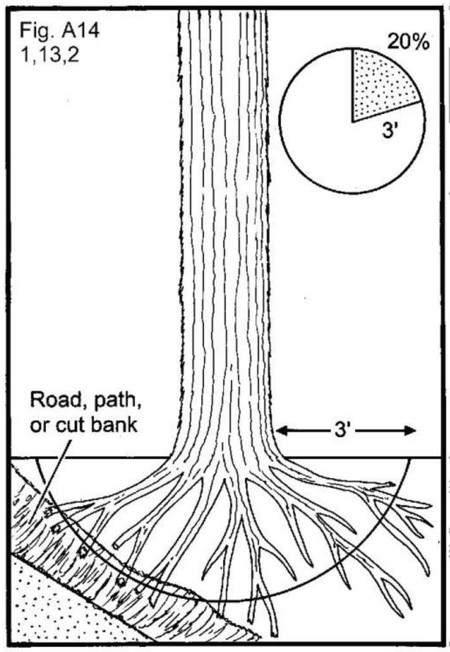


11 - Broken bole or roots <3' from bole

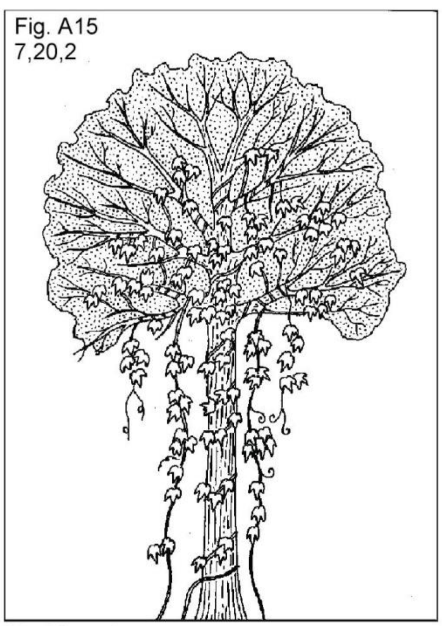
Figure 8.37: Examples of damage coding.



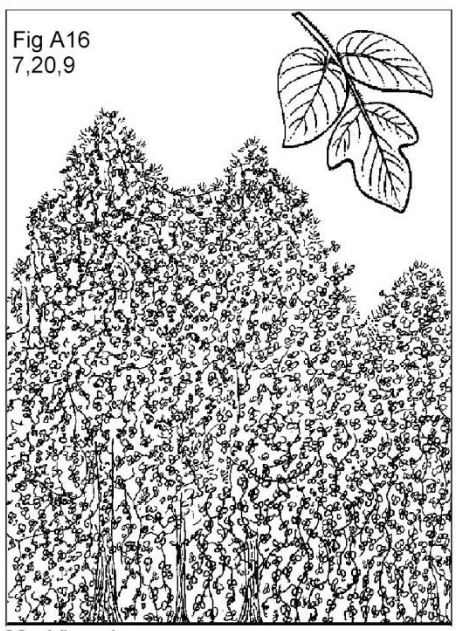
12 - Brooms on roots or bole



13 - Broken or dead roots >3' from bole



20 - Vines in crown



20 - Vines in crown

Figure 8.38: Examples of damage coding.

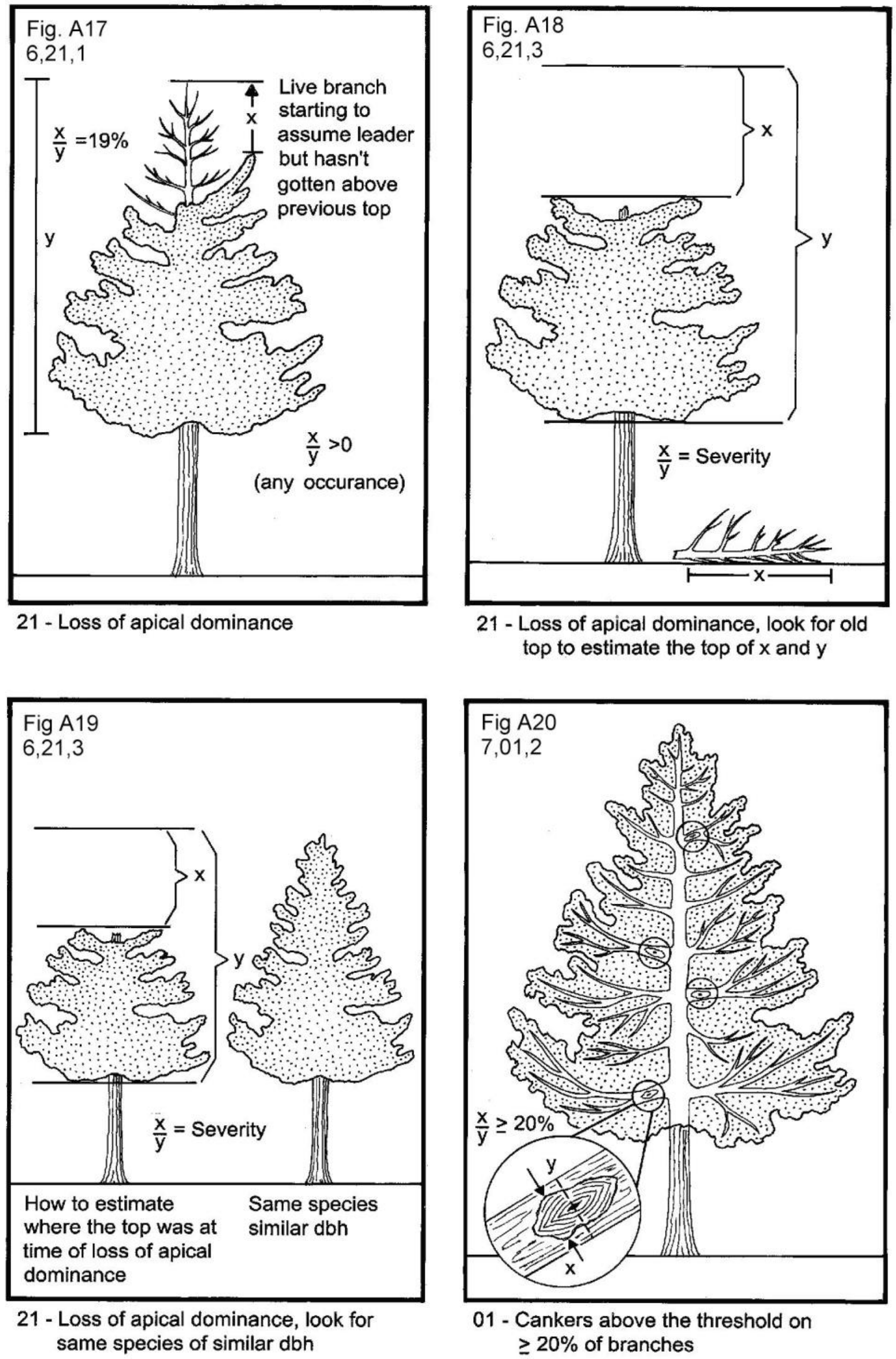
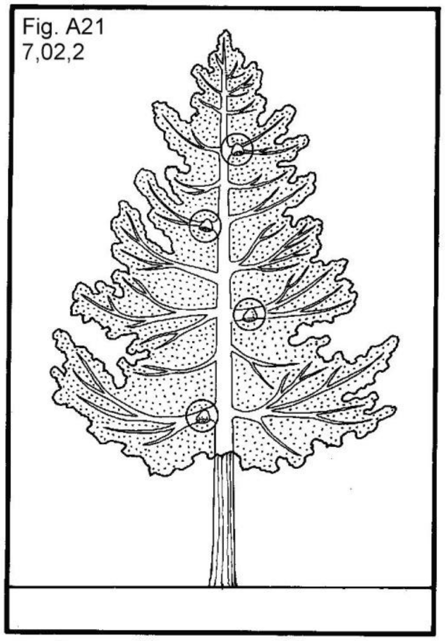
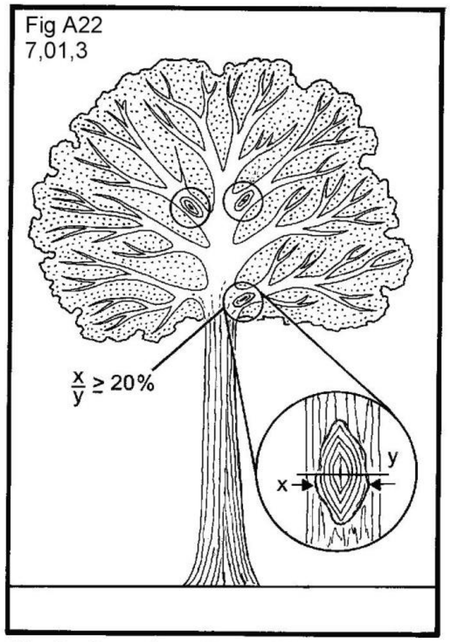


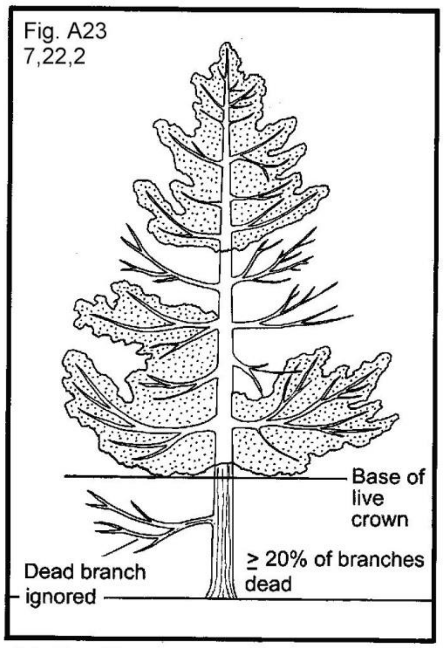
Figure 8.39: Examples of damage coding.



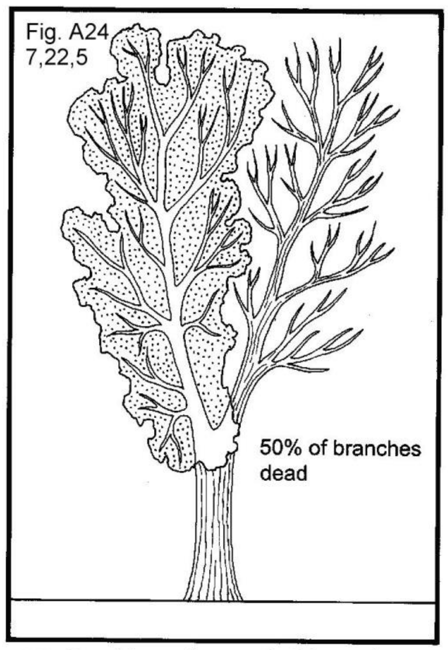
02 - Conks on ≥ 20% of branches



01 - Cankers above threshold on ≥ 20% of branches

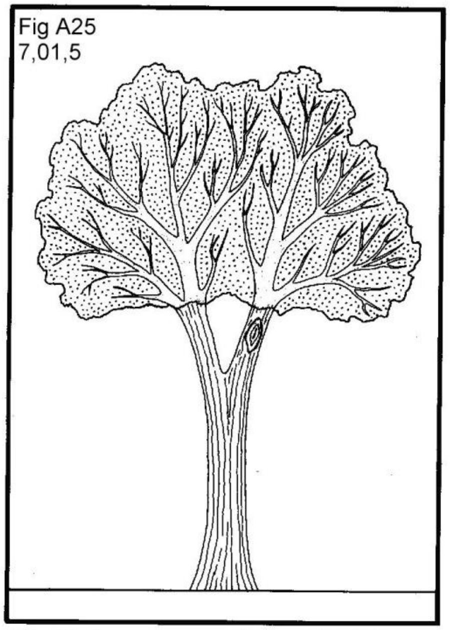


22 - Dead branches within the live crown area. If branches cannot easily be counted, estimate % area of live crown affected

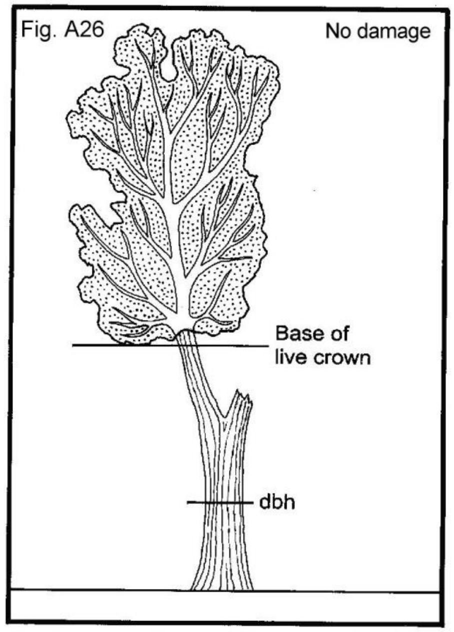


22 - Dead branches; only 2 branches present within live crown area, fines present and ≥ 20% of branch dead

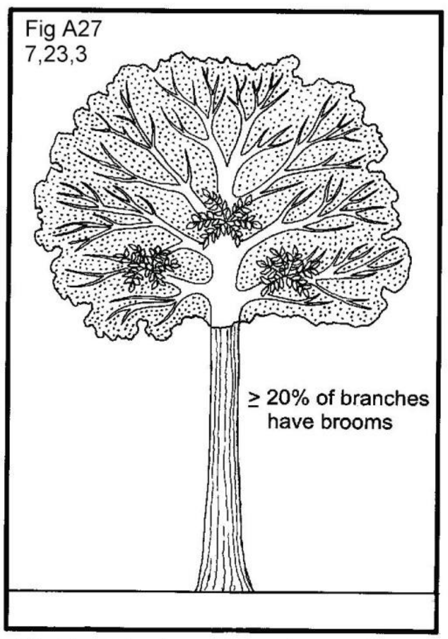
Figure 8.40: Examples of damage coding.



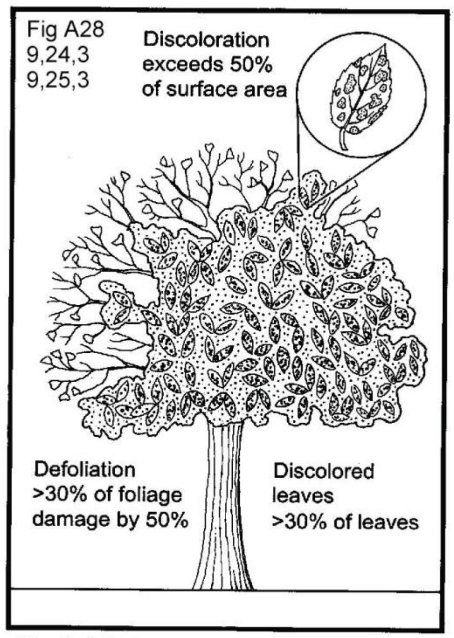
01 - Canker; no crown stem and only 2 branches present



No damage - base of live crown is above old fork, stub is a snag branch



23 - Excessive branching or brooms in crown



24 - Defoliation, 25 - Discoloration

Figure 8.41: Examples of damage coding.

Procedures to Record Multiple Occurrences of the Same Damage

Damage codes 01 (canker), 03 (open wounds), and 04 (resinosis/gummosis) must meet a threshold of 20 percent of the circumference at the point of occurrence, within any 3-foot section. Multiple cankers or open wounds which are directly above one another pose no more threat to long term tree survival than would a single damage incidence of the same width. However, should multiple damages be located horizontally within any 3-foot section, the translocation of water and nutrients would be significantly affected. The widths of each individual damage are added and compared as a percent to the total circumference at the midpoint of the 3-foot section (Figure 8.34).

Procedures to Measure Circumference Affected

A practical approach is to observe every face of the "stump", bole, or crownstem. About 40 percent of the circumference of a face can be observed at any one time. The damage is measured horizontally between the margins. If the cumulative area affected within a 3-foot section exceeds 1/2 of any face, then the 20 percent minimum threshold has been met. The percent of the circumference affected by damage is then estimated in 10 percent classes. If in doubt, measure the damage and circumference at the widest point of occurrence on the bole with a linear tape, and determine the percent affected.

8.14.4 DAMAGING AGENT 1 (PACIFIC ISLANDS)

[DMG_AGENT1_CD_PNWRS]

When known, record the specific name of the damaging agent (genus and species, or common name of fungal pathogens, insects, parasites…) in tree notes. **For Pig damage make sure to code 47 rather than the general animal code of 40.** If the damaging agent is unknown record 70.

When Collected: All tally trees where DAMAGE LOCATION 1 > 0
Field width: 2 digits
Tolerance: No errors
Values:

10	Insect
20	Disease
30	Fire
40	Animal
47	**Pigs, wild boars**
50	Weather
60	Vegetation (suppression, competition, vines/kudzu)
70	Unknown/not sure/other – includes death from human activity not related to silvicultural and landclearing activity (accidental, random, etc) (include notes)
80	Human-caused (cultural, logging, accidental, etc.)
90	Physical (roots are undermined by erosion, hit by falling tree)

8.14.5 DAMAGE LOCATION 2 (CORE 5.20.4)

[DAMLOC2]

Record the location on the tree where TREE DAMAGE 2 is found. Follow the same procedures as for DAMAGE LOCATION 1.

8.14.6 DAMAGE TYPE 2 (CORE 5.20.5)

[DAMTYP2]

RECORD the second damage type observed that meets the damage threshold definition in the lowest location. Describe the damage agent in tree notes. Follow the same procedures as for DAMAGE TYPE 1.

8.14.7 DAMAGE SEVERITY 2 (CORE 5.20.6)

[DAMSEV2]

Record the amount of affected area (above threshold) in DAMAGE LOCATION 2 recorded for DAMAGE TYPE 2. Follow the same procedures as for DAMAGE SEVERITY 1.

8.14.8 DAMAGING AGENT 2 (PACIFIC ISLANDS)

[DMG_AGENT2_CD_PNWRS]

When known, record the specific name of the damaging agent (genus and species, or common name of fungal pathogens, insects, parasites…). If the damaging agent is unknown record 70.

8.14.9 DECAY CLASS (CORE 5.23)

[DECAYCD]

Record for each standing dead tally tree, 5.0 inches in diameter and larger, the code indicating the trees stage of decay.

When Collected: All standing dead tally trees $\geq$ 5.0 in DBH
Field width: 1 digit
Tolerance: +/- 1 class
Values: Use the following table for guidelines:

Decay class stage (code)	Limbs and branches	Top	% Bark Remaining	Sapwood presence and condition*	Heartwood condition*
1	All present	Pointed	100	Intact; sound, incipient decay, hard, original color	Sound, hard, original color
2	Few limbs, no fine branches	May be broken	Variable	Sloughing; advanced decay, fibrous, firm to soft, light brown	Sound at base, incipient decay in outer edge of upper bole, hard, light to reddish brown
3	Limb stubs only	Broken	Variable	Sloughing; fibrous, soft, light to reddish brown	Incipient decay at base, advanced decay throughout upper bole, fibrous, hard to firm, reddish brown
4	Few or no stubs	Broken	Variable	Sloughing; cubical, soft, reddish to dark brown	Advanced decay at base, sloughing from upper bole, fibrous to cubical, soft, dark reddish brown
5	None	Broken	Less than 20	Gone	Sloughing, cubical, soft, dark brown, OR fibrous, very soft, dark reddish brown, encased in hardened shell

*Characteristics are for Douglas-fir. Dead trees of other species may vary somewhat. Use this only as a guide.

8.14.10 EPIPHYTE LOADING (PACIFIC ISLANDS)

[EPIPHYTE_PNWRS]

Record a code indicating the extent of epiphyte loading for all live trees ≥ 1.0 in. d.b.h. “Epiphyte” is defined as a plant that uses a tree for support, but does not draw nourishment from it. For our purposes, vines and lianas are considered epiphytes and only vascular species will be included in the total.

Use the Hawksworth six-class rating system: divide the tree into thirds, and rate each third using the following scale.

Code	Epiphytes	Description
0	No visible epiphytes	None
1	Light epiphytes	< 50 percent of the branches or bole is loaded with epiphytes
2	Heavy epiphytes	> 50 percent of the branches or bole loaded with epiphytes

Sum the three individual ratings to obtain a total epiphyte class (0 to 6) for the tree.

Example: A tree has no loading in top third of crown, many epiphytes in the middle third, and has a few epiphytes in the lower third.

The total score is: 0 + 2 +1 = 3; the code is: "3"

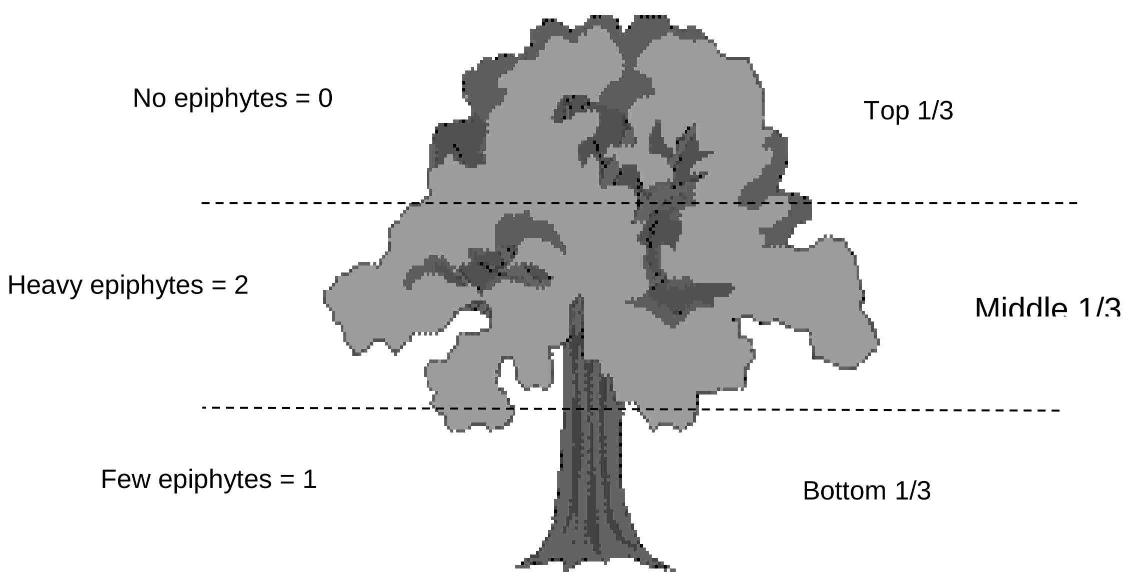


Figure 8.42: Example of epiphyte loading for tree crown

When Collected: All live trees ≥ 1.0 in DBH.
Field width: 1 digit
Tolerance: +/- 1 class
Values: 0 to 6.

8.14.11 PRIORITY DAMAGE (PACIFIC ISLANDS) [PRIDAM_PNWRS]

Record a code to describe a damage that does not meet the national minimum thresholds for recording damage, but is of special interest in this region. For example, code any evidence of rhinoceros beetle damage on coconut trees. Record 0 if none of the specified damages are present.

When collected: All live tally trees ≥ 1.0 in DBH
Field width: 1 digit
Tolerance: No errors
Values:

0 None of the following present
1 Rhinoceros beetle
2 Brown root rot
3 Tinangaha
4 Banana nematodes
5 Puccinia psidii
6 Pig, wild boar
7 Cycad Scale

8.14.12 PRIORITY DAMAGE SEVERITY (PACIFIC ISLANDS) [PRIDAMSEV_PNWRS]

Record the amount of area affected by the PRIORITY DAMAGE when Rhinoceros beetle or Puccinia psidii are recorded for PRIORITY DAMAGE. These damages have no minimum threshold.

To code DAMAGE SEVERITY for Rhinoceros beetle use the following directions:

1. Draw an imaginary horizontal line just above the coconuts (or where they should be)
2. Count the number of fronds that grow above that line
3. Count the number of fronds in #2 that have been damaged by rhinoceros beetles
4. Divide the number of damaged fronds by the number of fronds counted in # 2.
5. Multiply by 100

Record this number as the severity of rhinoceros beetle damage. If the resulting number is 100, record 99.

When collected: When PRIORITY DAMAGE = 1 (Rhinoceros beetle) or 5 (Puccinia psidii)
Field width: 2 digits
Tolerance: +/- 1
Values:
When PRIORITY DAMAGE = 1 (Rhinoceros beetle), values = 01 – 99
When PRIORITY DAMAGE = 5 (Puccinia psidii), record the highest level of severity found on the tree (highest numbered code):

1 Symptoms found, but no rust spores confirmed
2 1-5 spots, yellow or white urediniospores confirmed
3 3-7 large or about 10-15 small spots, with a moderate level of disease; yellow/white urediniospores confirmed
4 Severe disease levels; stems with pustules and/or no leaves
5 Dead apical tips and numerous defoliated tips

8.14.13 ROTTEN/MISSING CULL (CORE OPTIONAL 5.13)

[CULL_FLD]

Record the percent rotten or missing cubic-foot cull for all live tally trees greater than or equal to 5.0 inches DBH (CORE) and all standing dead tally trees greater than or equal to 5.0 inches DBH.

Record the percentage of rotten and missing cubic-foot volume, to the nearest 1 percent. When estimating volume loss (tree cull), only consider the cull on the merchantable bole/portion of the tree, from a 1-foot stump to a 4-inch DOB top. Do not include any cull estimate above ACTUAL LENGTH.

Rotten and missing volume loss is often difficult to estimate. Refer to supplemental disease and insect pests field guides and local defect guidelines as an aid in identifying damaging agents and their impact on volume loss. Use your best judgment and be alert to such defect indicators as the following:

- Cankers or fruiting bodies.
- Swollen or punky knots.
- Dull, hollow sound of bole (use regional standards).
- Large dead limbs, especially those with frayed ends.
- Sawdust around the base of the tree.
- Metal imbedded in the wood.

When cull is coded because of rot, then a damage must also be coded.

When Collected: All live and standing dead tally trees ≥ 5.0 in DBH
Field width: 2 digits
Tolerance: +/- 10 %
Values: 0 to 99

8.15 CAUSE OF DEATH (CORE 5.21)

[AGENTCD]

Record a cause of death for all trees that have died or been cut since the previous survey. If cause of death cannot be reliably estimated, record unknown/not sure/other.

When Collected: SAMPLE KIND = 2 plots: all PREVIOUS TREE STATUS = 1 and PRESENT TREE STATUS = 2 or 3; or PRESENT TREE STATUS = 2 and RECONCILE = 1, 2, or 3

Field width: 2 digits
Tolerance: No errors
Values:

10	Insect
20	Disease
30	Fire
40	Animal
50	Weather
60	Vegetation (suppression, competition, vines/kudzu)
70	Unknown/not sure/other - includes death from human activity not related to silvicultural or landclearing activity (accidental, random, etc.). TREE NOTES required.
80	Silvicultural or landclearing activity (death caused by harvesting or

other silvicultural activity, including girdling, chaining, etc., or to landclearing activity)

8.16 TREE NOTES (CORE 5.27)

[NOTES]

Record notes pertaining to an individual tree as called for to explain or describe another variable.

When collected: All trees, as needed
Field width: 2000 Characters
Tolerance: N/A
Values: English language words, phrases and numbers

9 SEEDLING DATA

Stocking and regeneration information are obtained by counting live seedlings within the 6.8-foot radius microplot located 90 degrees and 12.0 feet from each subplot center within each of the four subplots. Conifer seedlings must be at least 6.0 inches in length and less than 1.0 inch at DBH in order to qualify for tallying. Hardwood seedlings must be at least 12.0 inches in length and less than 1.0 inch at DBH in order to qualify for tallying. Seedlings are counted in groups by species and condition class, up to five individuals per species. Counts beyond five estimated. Only count seedlings occurring in accessible forest land condition classes (CONDITION CLASS STATUS = 1) *or measurable nonforest condition classes (NONFOREST CONDITION CLASS SAMPLING STATUS =1), using the guidelines listed below*.

Count all live seedlings that have their base inside the microplot boundary regardless of vigor, damage, or closeness to other trees, but count only one seedling from a clump; a clump is 3 or more live stems that sprouted from a common root base (including stumps).

9.1 SEEDLING COUNT DATA ITEMS

9.1.1 SUBPLOT NUMBER (CORE 6.1)
[SUBP]

This is a generated code corresponding to the number of the subplot

When Collected: All seedling count records
Field width: 1 digit
Tolerance: No errors
Values:
1 Center subplot
2 North subplot
3 Southeast subplot
4 Southwest subplot

9.1.2 CONDITION CLASS NUMBER (CORE 6.3)
[CONDID]

Use the same procedures defined in the Condition Class Chapter to assign the appropriate CONDITION CLASS NUMBER to the seedlings rooted in the respective condition.

When Collected: All seedling count records
Field width: 1 digit
Tolerance: No errors
Values: 1-9

9.1.3 SPECIES (CORE 6.2)

[SPCD]

Record the SPECIES code from the Tree Species List. Use the same procedures as the data item found in the Tree and Sapling Data Chapter

When Collected: All seedling count records
Field width: 4 digits
Tolerance: No errors for genus, no errors for species
Values: See Appendix 1 (Tree Species List)

9.1.4 SEEDLING COUNT (CORE 6.4)

[TREECOUNT]

On each microplot, record the number of live tally tree seedlings, by species and condition class. Whena seedling count of the full microplot will be prohibitively time consuming (over 50 seedlings for a given species), it is acceptable to estimate by counting the number of seedlings on one quarter of the microplot and multiplying by four (given that there is only one condition class on the microplot). Repeat for each species. Conifer seedlings must be at least 6.0 inches in length and less than 1.0 inch at DBH to qualify for counting. Hardwood seedlings must be at least 12.0 inches in length and less than 1.0 inch at DBH in order to qualify for counting.

Multiple "suckers" that originate from the same location, and stump sprouts are considered one seedling. Do not tally or count "layers" (undetached branches partially or completely covered by soil, usually at the base) as seedlings. Do not tally any seedlings that sprout from a live tally tree.

When Collected: Each accessible forest land condition class (CONDITION CLASS STATUS = 1) on each microplot and each accessible nonforest condition classes on each microplot when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and CONDITION CLASS STATUS = 2 and NONFOREST CONDITION CLASS STATUS = 2)

Field width: 3 digits
Tolerance: No errors for 5 or fewer per species; +/- 20% over a count of 5
Values: 001 through 999

9.1.5 SEEDLING NOTES (PNW)

[NOTES]

Record notes to clarify or explain a special situation in the SEEDLING NOTES.

When collected: As needed
Field width: 2000 characters
Tolerance: N/A
Values: Single words and abbreviated sentences

10 VEGETATION PROFILE

The Phase 2 (P2) vegetation data are collected to provide vegetation structure and dominant species composition for vascular plants. The data collected provide a horizontal and vertical estimation of vegetation located within the sample area and provide information for the most abundant species found on the subplot. Information on the abundance, structure, and species composition of understory plant communities has many uses. It can be used to assess wildlife habitat, biomass, forage availability, grazing potential, vegetation competition with tree growth, fuel loadings from understory vegetation, and potential site productivity. The most abundant species provide information to classify plant community types into plant associations and to predict associated forest stand characteristics. Accurately representing the species present on a site and their change in abundance in response to forest development, disturbance, or management is therefore important to a wide variety of users. This information is also used to augment forest ecosystem health assessments from P3 plots, in terms of vegetation structure and rates of change of community vascular plant composition.

10.1 Vegetation Sampling Design

The Phase 2 Vegetation Profile includes measurements of vegetation structure – cover by layer and total aerial cover of each growth habit.

Sampling of vegetation is focused on accessible condition classes within the 24.0-foot radius subplot. Inventory units implementing the vegetation profile determine if they will include accessible forested lands, or any accessible land (P2 Vegetation Sampling Status). If the area of an accessible condition class is less than 100 percent on a subplot, vegetation measurements are done only on the portion that accessible. If multiple accessible condition classes are present on the subplot, separate estimates are made for each condition class area on the subplot.

Vegetation is best recorded when all plant species are fully leafed out. However, crews may end up visiting plots early in the season before leaves are fully expanded or late in the season when plants are beginning to senesce. Canopy cover is vertically projected from the outline of the foliage as they see it **at the time of plot visit.** Notes can be added to subplot records indicating unusual phenological conditions. Crews should not collect vegetation data in leaf off condition or when snow covers the plot (see 10.3.2 P2 VEG SUBPLOT SAMPLE STATUS).

10.2 General definitions

Canopy Cover – Canopy cover is defined as the area of ground surface covered by a vertical projection of the canopy of a vascular plant. The canopy is described by a polygon surrounding the outer edges of the foliage (Figure 10.1 Assessing Canopy Cover), without subtracting any normal spaces occurring between the leaves of plants (Daubenmire 1959[1]). Overlapping crowns within a species or growth habit are not double-counted; the maximum possible cover is 100 percent. All estimates on the cover of vegetation are focused on plants or plant parts that are located within the sampled condition class within the subplot perimeter (24.0-foot radius, horizontal distance) and any foliar parts overhanging the

[1] Daubenmire. R. 1959. A canopy-coverage method of vegetational analysis. Northwest Science 33(1): 43-64.

sampled condition class within the subplot. Canopy cover is collected by height layer or as a total (aerial view) cover across all layers for all growth habits in *Vegetation Structure* (10.5). Total aerial cover is collected for recorded species in *Species Composition* (10.4). Cover is estimated to the nearest 1 percent. See tabulation below for cover to area relationships for a 1/24 acre subplot and figure 10.2 (example of growth habit by layer) for additional visual calibrations. Group practice in the field is a mandatory training exercise.

Cover	Area (ft^2)	Square length on side (feet)	Circle radius (feet)
1%	18	4.3	2.4
3%	54	7.4	4.2
5%	90	9.5	5.4
10%	181	13.4	7.6
15%	271	16.5	9.3
20%	362	19.0	10.7
25%	452	21.3	12.0
50%	905	30.1	17.0

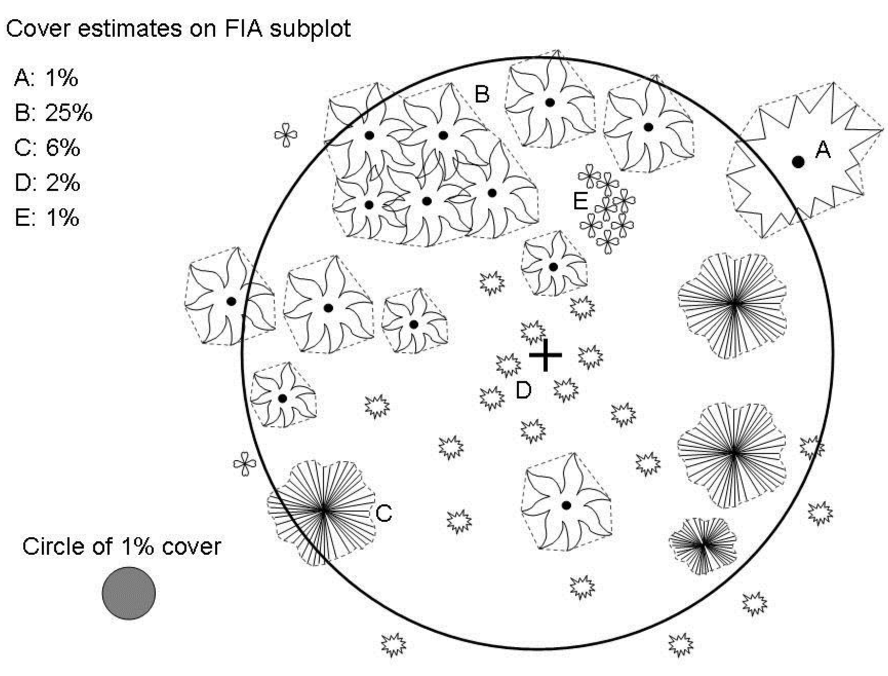


Figure 10.1: Assessing canopy cover. See individual variable text for more detail.

Growth Habits – P2 Vegetation data is collected by growth habits at each level of detail. In general, growth habits for vascular plants include trees, shrubs and woody vines, forbs, and grass-like plants (graminoids).

Layer Codes – Growth Habit groups are assessed by layers in *Vegetation Structure* (8.4), and one of the following layer codes (section 10.4.7 SPECIES VEGETATION LAYER) will be assigned to individual plant species in *Species Composition* (10.4).

NRCS PLANTS database – The Natural Resource Conservation Service (NRCS) PLANTS Database provides standardized information about the vascular plants, mosses, liverworts, hornworts, and lichens of the U.S. and its territories. It includes names, plant symbols, checklists, distributional data, species abstracts, characteristics, images, crop information, automated tools, onward Web links, and references:

USDA, NRCS. 2010. The PLANTS Database (http://plants.usda.gov, 1 January 2010). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
FIA currently uses a stable codeset downloaded in January of 2010.

Table 10.1: Estimation of canopy cover by layer and aerial view of each growth habit in figure 10.2

Vegetation Structure Growth Habit	Layer 1 (0-2.0')	Layer 2 (2.1'-6.0')	Layer 3 (6.1'-16.0')	Layer 4 (>16.1')	Aerial
		Percent canopy cover			
Tally tree sp (TT)	005	013	019	08	022
Non-tally tree sp (NT)	000	000	000	000	000
Shrub & Vine (SH)	000	000	000	000	000
Forb (FB)	002	000	000	000	002
Graminoid (GR)	003	000	000	000	003

Table 10.2: Estimation of canopy cover by species in figure 10.2

Level of Detail	Species Growth Habit	Species Code	Cover	Layer
2	GR	FEAR2	003	1
2	SD	ABCO	003	1
2	SD	POTR5	008	3
3	LT	POTR5	008	4
3	LT	ABCO	006	3

Note: FRVI, estimated at 2%, was not recorded, and ABCO and POTR5 are present as two different growth habits (seedling/sapling and large tree) with at least 3% cover.

10.3 Vegetation Data Collection Location – Subplot-Level Variables

10.3.1 SUBPLOT NUMBER (CORE OPTIONAL 8.4.1)

[SUBPLOT.SUBP]

Generated code corresponding to the number of the subplot.

When collected: On all plots where P2 vegetation is being sampled (P2 VEGETATION SAMPLING STATUS = 1 or 2)
Field width: 1 digit
Tolerance: No errors
Values:

1	Center subplot
2	North subplot
3	Southeast subplot
4	Southwest subplot

10.3.2 P2 VEG SUBPLOT SAMPLE STATUS (CORE OPTIONAL 8.4.2) [SUBPLOT.P2VEG_SUBP_STATUS_CD]

Record the code to indicate if the subplot was sampled for P2 vegetation. A condition may be sampled but not have any vascular plants present. If **all** the vegetation measurements cannot be completed on the subplot (for example, deep snow or water, hazardous weather, time limitation), enter code 2 and do not record **any** vegetation measurements.

When collected: On all subplots where P2 vegetation is being sampled on accessible forest land (P2 VEGETATION SAMPLING STATUS=1 and SUBPLOT STATUS = 1) or is being sampled on accessible forest land or nonforest land and at least one accessible nonforest land condition is present on the plot (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST SUBPLOT STATUS=1)

Field width: 1 digit
Tolerance: No errors
Values:

1	Subplot sampled
2	Subplot not sampled

10.3.3 VEGETATION NONSAMPLED REASON (CORE OPTIONAL 8.4.3) [SUBPLOT.P2VEG_SUBP_NONSAMPLE_REASN_CD]

Record the reason why vegetation on a subplot cannot be sampled.

When collected: On all subplots where P2 vegetation is being sampled on all accessible land conditions (P2 VEG SUBPLOT SAMPLE STATUS = 2)

Field width: 2 digits
Tolerance: No errors
Values:

04	Time limitation
05	Lost data (for office use only)
10	Other (for example, snow or water covering vegetation that is supposed to be sampled)

10.3.4 VEGETATION SUBPLOT NOTES (CORE OPTIONAL 8.4.5) [P2VEG_SUBP_STRUCTURE.NOTES]

Use this field to record notes pertaining to the subplot, and any unusual conditions encountered.

When collected: VEGETATION NONSAMPLED REASON = 10 or as needed
Field width: 2000 alphanumeric characters
Tolerance: N/A
Values: English language words, phrases, and numbers

10.4 Species Composition

Species are recorded when LEVEL OF DETAIL = 2 or 3. Identify the four most abundant species within each growth habit group (tree seedlings and saplings, shrubs/woody vines, forbs, graminoids, and overstory trees) that occupy 3 percent or greater canopy cover on the subplot. Although up to four species with cover of at least 3 percent per growth habit can be recorded, crews should not spend more than 5 minutes searching for additional species when less than four species are not readily observable. The methods described assume that only one field crew member per plot is entering vegetation profile data. Other crew members may assist with assessments, but data entry by only one person is highly recommended.

When there are multiple conditions within a subplot, the species must be present at 3 percent or more cover on the full 24-foot radius subplot in order to be recorded. If part of the subplot is a non-sampled condition (e.g., nonforest or inaccessible), estimate cover for the full subplot if possible; otherwise assume the species density is the same on the non-sampled portion. If a species is present at 3 percent cover or more on the full subplot, record species and cover separately for each condition, by only including cover within a vertical projection of the condition boundary within a subplot. Cover percentages are always fixed on the full subplot area, regardless of condition proportion. For example, on a subplot with two sampled conditions, a species occurs with a cover equal to a circle with a radius of 7.6 feet on the full subplot, or 10 percent cover, so it is recorded. On condition class #1, it covers an area equal to a circle of 2.4-foot radius and is recorded as 1 percent cover. The remainder, 9 percent cover, is recorded for condition #2. Cover values less than 3 percent for a condition that occupies part of a subplot are valid as long as the cover of the species on the full subplot is at least 3 percent. See figure 10.3 (example of species cover estimation) for an example.

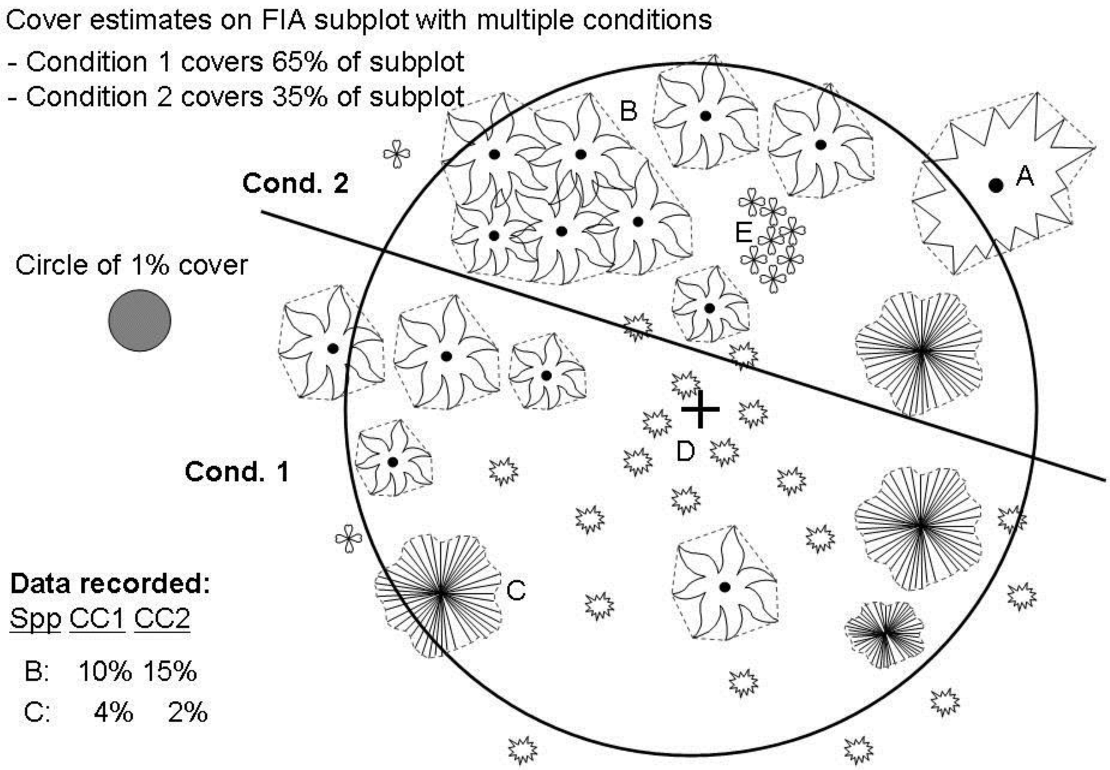


Figure 10.3: Example of species cover estimation on a subplot with 2 conditions. See figure 10.1 for total cover across the subplot. In figure 10.1, species A, D, and E would be included in estimates of vegetation structure by growth habit, but not recorded for species composition. Note that species with subplot cover <3% are not recorded, but that cover recorded on a condition can be less than 3%.

10.4.1 SPECIES CODE (CORE OPTIONAL 8.6.2)

[P2VEG_PLOT_SPECIES.VEG_FLDSPCD]

Record a code for each sampled vascular plant species found rooted in or overhanging the sampled condition of the subplot at any height. Species codes must be the standardized codes in the Natural Resource Conservation Service (NRCS) PLANTS database (currently January 2010 version). Identification to species only is expected. However, if subspecies information is known, enter the appropriate NRCS code. For graminoids, genus and unknown codes are acceptable, but do not lump species of the same genera or unknown code. For example, if several unknown CAREX species are present, only record the individual species present with cover of at least 3 percent.

If a plant cannot be identified quickly and confidently, assign a NRCS PLANTS genus or unknown code appropriate to the species. Collect a specimen away from the subplot unless the species is locally sparse or another SPECIMEN NOT COLLECTED REASON CODE (10.4.4) applies. A species is “locally sparse” if 5 or fewer plants are present in the entire plot (4 subplots) and immediate surrounding area. A species may be sparse and still meet the criteria for inclusion in species composition, but this will be rare.

Acceptable unknown codes

Code	Common Name
2FERN	Fern or Fern Ally
2FORB	Forb (herbaceous, not grass nor grass-like)
2FD	Forb, dicot
2FM	Forb, monocot
2GRAM	Graminoid (grass or grass-like)
2GA	Grass, annual
2GP	Grass, perennial
2GL	Grass-like, (sedges and rushes)
2PLANT	Plant
2SHRUB	Shrub (>.5m)
2SUBS	Subshrub (<.5m)
2TREE	Tree
2VH	Vine, herbaceous
2VW	Vine, woody

When collected: LEVEL OF DETAIL = 2 or 3 and species canopy cover on the full subplot is 3% or greater.
Field width: 8 alpha-numeric characters
Tolerance: No errors
Values: Accepted NRCS species code when the species is known, or an accepted NRCS genus or unknown code when the species is not known

10.4.2 UNIQUE SPECIES NUMBER (CORE OPTIONAL 8.6.3) [P2VEG_PLOT_SPECIES.UNIQUE_SP_NBR]

When any code is entered for the first time on a plot, it is assigned UNIQUE SPECIES NUMBER = 1. If more than one unidentified species is discovered that is described by the same genus or unknown code, the next sequential number is assigned. If a recorded unidentified species is encountered again elsewhere on the plot, the field crew records the species with the same genus or unknown code with the same unique species number.

When collected: All species recorded
Field width: 2 digits
Tolerance: No errors
Values: 1-99, assigned in sequential numbers

10.4.3 SPECIMEN OFFICIALLY COLLECTED (CORE OPTIONAL 8.6.6) [P2VEG_PLOT_SPECIES.SPECIMEN_COLLECTED]

Record if a specimen was collected or not for each species, genus or unknown code entered as a new unique species.

When collected: All species recorded
Field width: 1 digit
Tolerance: No errors
Values

0 No, a specimen was not collected
1 Yes, a specimen was collected

10.4.4 P2 SPECIMEN NOT COLLECTED REASON CODE (CORE OPTIONAL 8.6.8)

[P2VEG_PLOT_SPECIES.SPECIMEN_NOT_COLLECTED_REASON]

Record the code that describes why a specimen has not been collected.

When collected: An unknown code or genus code is entered and SPECIMEN OFFICIALLY COLLECTED = 0
Field width: 2 digits
Tolerance: No errors
Values:

01 Species is locally sparse (fewer than 5 individual plants in area of the plot)
02 Species has no mature foliage or reproductive parts present, so is unlikely to be identifiable if collected.
03 Hazardous situation
04 Time limitation
05 Wilderness or reserved land where plant collections are not allowed
06 Specimen collected for immediate/local identification
07 Not required by inventory unit
10 Other (explain in notes)

10.4.5 SPECIMEN LABEL NUMBER (CORE OPTIONAL 8.6.7)

[SUBPLOT COMMUNITY_DESC_SPECIMEN_LABEL]

Record the label number for the collected specimen. Pre-numbered labels are provided to each crew by the regional coordinator.

When collected: SPECIMEN OFFICIALLY COLLECTED = 1
Field width: 5 digits
Tolerance: No errors
Values: 1 to 99999, as pre-printed and assigned by region

10.4.6 SPECIES GROWTH HABIT (CORE OPTIONAL 8.6.1)

[P2VEG_PLOT_SPECIES.SUBP_#_COND_#_GROWTH_HABIT_CD]

Record the growth habit of the species. Tally tree species are always recorded as trees, even when they exhibit a shrub-like growth habit. However, because many species can exhibit various growth habits, it is important to note which growth habit each recorded species is demonstrating on the current condition. If a species has more than one growth habit on a condition in a subplot, record the one which is most prevalent; however, both tree habits (SD and LT) can be coded for the same species if LEVEL OF DETAIL=3 and the species is found in both size classes. A species may be recorded with a different growth habit on a different subplot-condition on the same plot.

When collected: LEVEL OF DETAIL = 2 or 3, and for each species recorded below.
Field width: 2 alphanumeric characters
Tolerance: No errors
Values:

SD Seedlings Saplings: Small trees less than 5 inches DBH, including tally and non-tally tree species. Up to four species are included if individual species total cover is at least 3% of subplot area when LEVEL Of DETAIL = 2 or LEVEL Of DETAIL =3.

SH Shrubs:/Woody Vines: Woody, multiple-stemmed plants of any size, and vines. Most cacti are included in this category. Up to four species are recorded if individual species total cover is at least 3% of the subplot area when LEVEL Of DETAIL = 2 or

LEVEL Of DETAIL =3.

FB Forbs: Herbaceous, broad-leaved plants; includes non-woody-vines, ferns (does not include mosses and cryptobiotic crusts). Up to four species are recorded if individual species total cover is at least 3% of the subplot area when LEVEL Of DETAIL = 2 or LEVEL Of DETAIL =3.

GR Graminoids: Grasses and grass-like plants (includes rushes and sedges). Up to four species are recorded if individual species total cover is at least 3% of the subplot area when LEVEL Of DETAIL = 2 or LEVEL Of DETAIL =3.

LT Large Trees: Up to four species of large trees (DBH at least 5 inches) are recorded if individual species cover is at least 3% of the subplot area, including both tally and non-tally tree species, when LEVEL Of DETAIL = 3.

10.4.7 SPECIES VEGETATION LAYER (CORE OPTIONAL 8.6.5)

[P2VEG_PLOT_SPECIES.SUBP_#_COND_#_LAYER]

For each individual species recorded, assign one of the vegetation layers. These layers illustrate the vertical diversity of the predominant species found on the subplot.

Assign each plant species record to only one of the vegetation layers. If a plant species in a growth habit is found in more than one layer, assign the entire plant to the layer where most of the cover occurs. If a species occupies multiple layers equally, assign the highest of the equally occupied layers. If a plant has a seed head that grows much taller than the rest of the plant, record the layer that the main part of the plant is in, not the top of the seed head.

When collected: For each species recorded.
Field width: 1 digit
Tolerance: No errors
Values: 1-4

1	0 to 2.0 feet
2	2.1 to 6.0 feet
3	6.1 to 16.0 feet
4	Greater than 16 feet

10.4.8 SPECIES CANOPY COVER (CORE OPTIONAL 8.6.4)

[P2VEG_PLOT_SPECIES.SUBP_#_COND_#_COVER_PCT]

For each species recorded, estimate and record the canopy cover present on the subplot-condition to the nearest 1 percent (note: cover is always recorded as a percent of the full subplot area, even if the condition being assessed does not cover the full subplot—see example under section 10.4 Species Composition). Canopy cover is identified as the area of ground surface covered by the outline of the foliage, ignoring any normal spaces occurring between the leaves of plants (Daubenmire 1959) by the canopy of each plant species (figure 10.1 Assessing Canopy Cover). Do not count overlapping crowns within a species. When recording cover for seedlings and saplings (SPECIES GROWTH HABIT=SD), do not include any canopy from trees greater than or equal to 5 inches DBH , regardless of how close to the ground the canopy extends. When LEVEL OF DETAIL=3, a separate estimate is made for the canopy of trees greater than or equal to 5 inches DBH.

When collected: For each plant species present on the subplot with canopy cover greater than or equal to 3%. A plant species is defined as a unique SPECIES CODE and UNIQUE SPECIES NUMBER pair.

Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
Values: 001-100

10.4.9 VEGETATION SPECIES NOTES (CORE OPTIONAL 8.6.9) [P2VEG_PLOT_SPECIS.NOTES]

Notes may be entered for any species encountered, but are required for each new species that is not identified. Enter text that describes the species. This text may be used in the specimen label and unknown report.

When collected: As needed
Field width: 2000 characters
Tolerance: N/A
Values: English language words, phrases, and numbers

10.5 Vegetation Structure

In this section, use ocular methods to estimate canopy cover by layer and aerial view coverage for each growth habit, and record to the nearest percent.

Canopy cover by layer:
Estimate the canopy cover for each of the four layers. Include growth habits present on the condition and any foliar parts overhanging the condition. For each layer cover, examine the canopy cover of each growth habit as if the other growth habits do not exist. Do not double count overlapping layers within a growth habit; visualize the cover layer collapsed into a 2-dimensional space. If a growth habit group does not have foliage in a layer, enter 0 (do not count tree boles as cover).

Aerial View Coverage:
Determine the total canopy cover by growth habit (trees, shrubs, forbs, and graminoids). Examine each growth habit individually as if the other growth habits do not exist. Do not double count overlapping layers within a growth habit (maximum cover=100%). To determine, estimate the area of ground surface covered by a vertically-projected polygon, described by the outline of the foliage, ignoring any normal spaces occurring between the leaves of plants (Daubenmire 1959) for the particular growth habit (figure 10.1) Assessing Canopy Cover).

Cover is estimated for each sampled condition of the subplot. If multiple sampled conditions occur on a subplot, treat the condition boundary as a vertical wall on the plot: **plant foliage is included in the condition it is hanging over**, even if the plant is rooted in a different condition. However, the foliage **cover value is always estimated as a percent of an entire subplot**. That is, if the cover of a growth habit within the condition is about equal to a circle with a radius of 5.3 feet, the cover estimate will always be 5 percent, even if only 30 percent of the subplot is in the condition on which the species is being measured.

The total cover for a specific growth habit must be equal to or greater than the highest cover recorded for an individual layer in that growth habit, but cannot be greater than the sum of the covers recorded for all the layers in that growth habit.

Vegetation Structure Growth Habits:
Apply the definitions that follow based on the species and appearance of the plants **on the subplot-condition** (i.e. do not put the same species in multiple growth habits on the same subplot-condition). If a tree species has been selected as a tally tree by the particular FIA unit, always record that species in the tally tree species growth habit (TT), even if it grows as a shrub in some environments. Woody plants not on the unit's tally tree list may have a tree growth habit in some environments, and these should be recorded as non-tally tree species (NT). If the growth habit is shrub in another environment, record that species as a shrub (SH). The definitions (adapted from NRCS PLANTS) are:

TT **Tally Tree Species (TT):** All core tree species **and** any core-optional tree species selected by a particular FIA unit. Any plant of that species is included, regardless of its shape and regardless of whether it was tallied on the subplot or microplot during tree tally (plants with canopy hanging into the subplot). Seedlings, saplings, and mature plants are included.

NT **Non-tally Tree Species (NT):** Tree species not on a particular FIA unit's tree tally list that are woody plants with a single stem, not supported by other vegetation or structures (not vines), and which are, or are expected to become, greater than 13 feet in height. Seedlings, saplings, and mature plants are included.

SH **Shrubs:/Woody Vines (SH):** Woody, multiple-stemmed plants of any size, and vines. Most cacti are included in this category.

FB **Forbs (FB):** Herbaceous, broad-leaved plants; includes non-woody-vines, ferns (does not include mosses and cryptobiotic crusts).

GR **Graminoids (GR):** Grasses and grass-like plants (includes rushes and sedges).

MO **Moss/Bryophytes: Small, non-vascular plants - LAYER 1 ONLY.**

10.5.1 CONDITION CLASS NUMBER (CORE OPTIONAL 8.4.4)
[P2VEG_SUBP_STRUCTURE.CONDID]

Record the number for the sampled condition class in which the vegetation is found. If multiple sampled conditions occur on the same subplot, data will be collected for each condition separately.

When collected: Any accessible condition class when P2 vegetation is being sampled on accessible forest land conditions (P2 VEGETATION SAMPLING STATUS =1)

Field width: 1 digit
Tolerance: No errors
Values: 1 to 9

10.5.2 TALLY TREE SPECIES COVER LAYER 1 (CORE OPTIONAL 8.5.1)

[P2VEG_SUBP_STRUCTURETREE_COVER_PCT_LAYER1]

Record a total canopy coverage for all tally tree species in layer 1 (0-2.0 feet) to the nearest percent. Cover includes all tally tree species present, regardless of DBH.

> When Collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)
> Field Width: 3 digits
> Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
> Values: 000-100

10.5.3 TALLY TREE SPECIES COVER LAYER 2 (CORE OPTIONAL 8.5.2)

[P2VEG_SUBP_STRUCTURE.TREE_COVER_PCT_LAYER2]

Record a total canopy coverage for all tally tree species in layer 2 (2.1- 6.0 feet) to the nearest percent. Cover includes all tally tree species present, regardless of DBH. Follow the same procedures as for TALLY TREE SPECIES COVER LAYER 1.

10.5.4 TALLY TREE SPECIES COVER LAYER 3 (CORE OPTIONAL 8.5.3)

[P2VEG_SUBP_STRUCTURE.TREE_COVER_PCT_LAYER3]

Record a total canopy cover for all tally tree species in layer 3 (6.1- 16.0 feet) to the nearest percent. Cover includes all tally tree species present, regardless of DBH. Follow the same procedures as for TALLY TREE SPECIES COVER LAYER 1.

10.5.5 TALLY TREE SPECIES COVER LAYER 4 (CORE OPTIONAL 8.5.4)

[P2VEG_SUBP_STRUCTURE.TREE_COVER_PCT_LAYER4]

Record a total canopy cover for all tally tree species in layer 4 (16.1 feet and above) to the nearest percent. Cover includes all tally tree species present, regardless of DBH. Follow the same procedures as for TALLY TREE SPECIES COVER LAYER 1.

10.5.6 TALLY TREE SPECIES COVER – AERIAL VIEW (CORE OPTIONAL 8.5.5)

[P2VEG_SUBP_STRUCTURE.TREE_COVER_PCT_AERIAL]

Record the total canopy cover for all tally tree species over all layers. Cover includes all tally tree species present, regardless of DBH. Follow the same procedures as for TALLY TREE SPECIES COVER LAYER 1, but include all layers.

10.5.7 NON-TALLY TREE SPECIES COVER LAYER 1 (CORE OPTIONAL 8.5.6)

[P2VEG_SUBP_STRUCTURE.NONTALLY_TREE_COVER_PCT_LAYER1]

Record a total canopy coverage for species **not** on the tally tree species list with tree growth habit in layer 1 (0-2.0 feet) to the nearest percent. Cover includes all non-tally tree species present, regardless of DBH.

When Collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)

Field Width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
Values: 000-100

10.5.8 NON-TALLY TREE SPECIES COVER LAYER 2 (CORE OPTIONAL 8.5.7)
[P2VEG_SUBP_STRUCTURE.NONTALLY_TREE_COVER_PCT_LAYER2]

Record a total canopy coverage for species **not** on the tally tree species list with tree growth form in layer 2 (2.1- 6.0 feet) to the nearest percent. Cover includes all non-tally tree species present, regardless of DBH. Follow the same procedures as for NON-TALLY TREE SPECIES COVER LAYER 1.

10.5.9 NON-TALLY TREE SPECIES COVER LAYER 3 (CORE OPTIONAL 8.5.8)
[P2VEG_SUBP_STRUCTURE.NONTALLY_TREE_COVER_PCT_LAYER3]

Record a total canopy cover for species **not** on the tally tree species list with tree growth form in layer 3 (6.1- 16.0 feet) to the nearest percent. Cover includes all non-tally tree species present, regardless of DBH. Follow the same procedures as for NON-TALLY TREE SPECIES COVER LAYER 1.

10.5.10 NON-TALLY TREE SPECIES COVER LAYER 4 (CORE OPTIONAL 8.5.9)
[P2VEG_SUBP_STRUCTURE.NONTALLY_TREE_COVER_PCT_LAYER4]

Record a total canopy cover for species **not** on the tally tree species list with tree growth habit in layer 4 (16.1 feet and above) to the nearest percent. Cover includes all non-tally tree species present, regardless of DBH. Follow the same procedures as for NON-TALLY TREE SPECIES COVER LAYER 1.

10.5.11 NON-TALLY TREE SPECIES COVER – AERIAL VIEW (CORE OPTIONAL 8.5.10)
[P2VEG_SUBP_STRUCTURE.NONTALLY_TREE_COVER_PCT_AERIAL]

Record the total canopy cover for species **not** on the tally tree species list with tree growth habit over all layers. Cover includes all non-tally tree species present, regardless of DBH. Follow the same procedures as for NON-TALLY TREE SPECIES COVER LAYER 1.

10.5.12 SHRUB AND WOODY VINE COVER LAYER 1 (CORE OPTIONAL 8.5.11)
[P2VEG_SUBP_STRUCTURE.SHRUB_VINE_COVER_PCT_LAYER1]

Record a total canopy coverage for shrubs in layer 1 (0-2.0 feet) to the nearest percent.

When collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)
Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
Values: 000-100

10.5.13 SHRUB AND WOODY VINE COVER LAYER 2 (CORE OPTIONAL 8.5.12)

[P2VEG_SUBP_STRUCTURE.SHRUB_VINE_COVER_PCT_LAYER2]

Record a total canopy coverage for shrubs in layer 2 (2.1-6.0 feet) to the nearest percent. Follow the same procedures as for SHRUB AND WOODY VINE COVER LAYER 1.

10.5.14 SHRUB AND WOODY VINE COVER LAYER 3 (CORE OPTIONAL 8.5.13)

[P2VEG_SUBP_STRUCTURE.SHRUB_VINE_COVER_PCT_LAYER3]

Record a total canopy coverage for shrubs in layer 3 (6.1-16.0 feet) to the nearest percent. Follow the same procedures as for SHRUB AND WOODY VINE COVER LAYER 1.

10.5.15 SHRUB AND WOODY VINE COVER LAYER 4 (CORE OPTIONAL 8.5.14)

[P2VEG_SUBP_STRUCTURE.SHRUB_VINE_COVER_PCT_LAYER4]

Record a total canopy coverage for shrubs in layer 4 (16.1 feet and above) to the nearest percent. Follow the same procedures as for SHRUB AND WOODY VINE COVER LAYER 1.

10.5.16 SHRUB AND WOODY VINE COVER—AERIAL VIEW (CORE OPTIONAL 8.5.15)

[P2VEG_SUBP_STRUCTURE.SHRUB_VINE_COVER_PCT_AERIAL]

Record the total canopy cover for the shrub/ woody vine growth habit over all layers. Follow the same procedures as for SHRUB AND WOODY VINE COVER LAYER 1, but include all layers.

10.5.17 FORB COVER LAYER 1 CORE OPTIONAL 8.5.16)

[P2VEG_SUBP_STRUCTURE.FORB_COVER_PCT_LAYER1]

Record a total canopy coverage for forbs in layer 1 (0-2.0 feet) to the nearest percent.

When collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)

Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
Values: 000-100

10.5.18 FORB COVER LAYER 2 (CORE OPTIONAL 8.5.17)

[P2VEG_SUBP_STRUCTURE.FORB_COVER_PCT_LAYER2]

Record a total canopy coverage for forbs in layer 2 (2.1-6.0 feet) to the nearest percent. Follow the same procedures as for FORB COVER LAYER 1.

10.5.19 FORB COVER LAYER 3 (CORE OPTIONAL 8.5.18)

[P2VEG_SUBP_STRUCTURE.FORB_COVER_PCT_LAYER3]

Record a total canopy coverage for forbs in layer 3 (6.1-16.0 feet) to the nearest percent. Follow the same procedures as for FORB COVER LAYER 1.

10.5.20 FORB COVER LAYER 4 (CORE OPTIONAL 8.5.19)

[P2VEG_SUBP_STRUCTURE.FORB_COVER_PCT_LAYER4]

Record a total canopy coverage for forbs in layer 4 (16.1 feet and above) to the nearest percent. Follow the same procedures as for FORB COVER LAYER 1.

10.5.21 FORB COVER—AERIAL VIEW (CORE OPTIONAL 8.5.20)

[P2VEG_SUBP_STRUCTURE.FORB_COVER_PCT_AERIAL]

Record the total canopy cover for the forb growth habit over all layers. Follow the same procedures as for FORB COVER LAYER 1.

10.5.22 GRAMINOID COVER LAYER 1 (CORE OPTIONAL 8.5.21)

[P2VEG_SUBP_STRUCTURE.GRAMINOID_COVER_PCT_LAYER1]

Record a total canopy coverage for graminoids in layer 1 (0-2.0 feet) to the nearest percent.

When collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)

Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
Values: 000-100

10.5.23 GRAMINOID COVER LAYER 2 (CORE OPTIONAL 8.5.22)

[P2VEG_SUBP_STRUCTURE.GRAMINOID_COVER_PCT_LAYER2]

Record a total canopy coverage for graminoids in layer 2 (2.1-6.0 feet) to the nearest percent. Follow the same procedures as for GRAMINOID COVER LAYER 1.

10.5.24 GRAMINOID COVER LAYER 3 (CORE OPTIONAL 8.5.23)

[P2VEG_SUBP_STRUCTURE.GRAMINOID_COVER_PCT_LAYER3]

Record a total canopy coverage for graminoids in layer 3 (6.1-16.0 feet) to the nearest percent. Follow the same procedures as for GRAMINOID COVER LAYER 1.

10.5.25 GRAMINOID COVER LAYER 4 (CORE OPTIONAL 8.5.24)

[P2VEG_SUBP_STRUCTURE.GRAMINOID_COVER_PCT_LAYER4]

Record a total canopy coverage for graminoids in layer 4 (16.1 feet and above) to the nearest percent. Follow the same procedures as for GRAMINOID COVER LAYER 1.

10.5.26 GRAMINOID COVER—AERIAL VIEW (CORE OPTIONAL 8.5.25)

[P2VEG_SUBP_STRUCTURE.GRAMINOID_COVER_PCT_LAYER_AERIAL]

Record the total canopy cover for the graminoid growth habit over all layers. Follow the same procedures as for GRAMINOID COVER LAYER 1.

10.5.27 MOSS/BRYOPHYTE COVER LAYER 1 (PACIFIC ISLANDS)
[P2VEG_SUBP_STRUCTURE.MOSS_BRYO_COVER_PCT_PNWRS]

Record the total canopy cover for mosses/bryophytes in layer 1(0-2.0 feet) to the nearest percent. Individual species will not be recorded, only layer 1 will be assessed, and there is no GROWTH HABIT for this data item. This is all that will be collected for Moss/Bryophytes.

When collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)

Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
Values: 000-100

11 INVASIVE PLANTS PROTOCOL

The objectives of the Phase 2 (P2) invasive plants protocol are to document abundance and monitor changes in abundance of selected species over time. Combined with other plot data and other datasets, this data can be used to predict the future spread of selected species. Invasive plant species are having tremendous economic and ecological impacts on our nation's forests, and the impacts are increasing over time. Providing accurate, statistically valid estimates of the distribution and abundance of some of the most damaging species will give managers and policy-makers a better understanding of the problem than they would otherwise have.

Each FIA unit, in collaboration with vegetation experts, has developed lists of the most important invasive species to monitor on forested lands. Depending on local needs or forest conditions, there may be different lists of species for individual states or portions of states. Changes to the species on these lists are managed by the individual FIA units using local change procedures. However, when an FIA unit samples invasive species, they will use the field protocols contained in this chapter.

Data will be collected by crew members who have been trained and certified in the Invasive plants protocol methods. These crew members are expected to have field guides that allow for unambiguous identification of the plant species on the list they are to use, and training in field identification and cover estimation of those species under different conditions.

Note: Avoid becoming part of the problem! There is a risk that field crews walking into plot locations could pick up seeds along roadsides or other patches of invasive plants and spread them through the forest and on to the plot. Be aware of the vegetation you are traveling through and consider stopping and removing seeds from boots and clothing before entering uninvaded lands, particularly remote areas that are rarely visited.

11.1 Invasive species sample design

Phase 2 sampling of invasive species is most often focused on accessible forest condition classes within the 24.0-foot radius subplot. If the total area of all accessible forest land condition classes is less than 100 percent on a subplot, **invasive species measurements are done only on the portion that is in accessible forest land condition classes**. If multiple accessible forested condition classes are present on the subplot, separate estimates are made for each condition class on the subplot. Canopy cover estimates are only made for the area within accessible forest condition(s)—for example, vegetation cover over-hanging a nonforest road condition is not included in the estimate.

However, each FIA unit has the **option to also sample invasive species on accessible nonforest land conditions (condition status 2)**, where desired or funded by specific landowners (e.g., on some National Forests in the West). Where this is done, estimates of invasive species abundance are maintained separately on forest and nonforest conditions.

Canopy cover is estimated for any listed invasive species present on the measured condition(s) of a subplot, regardless of abundance (i.e., there is not minimum cover threshold for sampling). When crews are not sure about the identification of a plant that might be a listed invasive, they are encouraged to collect specimens for later identification. Rules and expectations for plant collection and identification are specified by individual FIA units.

11.2 Species Records

The invasive plant recorder does a search of each measured condition on the subplot. **Only** listed species rooted in or overhanging (and rooted out of) this condition are included. For tree species, there are no minimum (or maximum) height limits as are required for seedling counts. All vegetation and plant parts that are or were alive during the current growing season are included in the cover estimates (e.g., brown Canada thistle in late summer is counted, live buds on Russian olive in late fall are used to estimate crown cover).

Total cover is estimated on measured conditions on each 24.0-foot radius subplot for every species on the invasive plant list found. If multiple conditions are being sampled on the same subplot, separate cover estimates for every species must be made.

See list of invasive plants that will be recorded for this inventory at the end of the invasives chapter.

11.2.1 SUBPLOT NUMBER (CORE OPTIONAL 9.4)

[INVASIVE_SUBPLOT_SPP.SUBP]

Record the code corresponding to the number of the subplot.

When collected: On all subplots where INVASIVE PLANT SAMPLING STATUS = 1 or 2
Field width: 1 digit
Tolerance: No errors
Values:

1 Center subplot
2 North subplot
3 Southeast subplot
4 Southwest subplot

11.2.2 INVASIVE PLANT SUBPLOT STATUS (CORE OPTIONAL 9.5)

[SUBPLOT.INVASIVE_SUBP_STATUS_CD]

(Subplot level data item) Record the code to indicate whether the subplot was sampled for invasive plants. A subplot may be sampled but not have any invasive plants present. If there is **any** part of an accessible portion of the subplot where other plot measurements are made but invasive plants can't be assessed (e.g., because of snow, water, hazardous weather, time limitation), enter code 3 and do not record **any** invasive plant measurements.

When collected: On all subplots where (INVASIVE PLANT SAMPLING STATUS=1 and SUBPLOT STATUS=1) or (INVASIVE PLANT SAMPLING STATUS=2 and NONFOREST SUBPLOT STATUS=2)

Field width: 1 digit
Tolerance: No errors
Values:

1 Subplot sampled, invasive plants present
2 Subplot sampled, no invasive plants present
3 Subplot not sampled for invasive plants

11.2.3 INVASIVE PLANT NONSAMPLED REASON (CORE OPTIONAL 9.6) [SUBPLOT.INVASIVE_NONSAMPLE_REASN_CD]

(Subplot level data item) Record the reason why a subplot cannot be sampled for invasive plants.

When collected: On all subplots where INVASIVE PLANT SUBPLOT STATUS = 3
Field width: 2 digits
Tolerance: No errors
Values:

4	Time limitation
5	Lost data (office use only)
10	Other (for example, snow or water covering vegetation that is supposed to be sampled) (Requires INVASIVE PLANT DATA NOTES)

11.2.4 INVASIVE PLANT DATA NOTES (CORE OPTIONAL 9.7) [INVASIVE_SUBPLOT_SPP.NOTES]

Use this field to record any notes about the condition on the subplot, particularly any unusual conditions encountered.

When collected: INVASIVE PLANT NONSAMPLED REASON=10 or as needed
Field width: 2000 Characters
Tolerance: N/A
Values: English language words, phrases, and numbers

11.2.5 CONDITION CLASS NUMBER (CORE OPTIONAL 9.8) [INVASIVE_SUBPLOT_SPP.CONDID]

Record the number for the measured condition class in which the invasive plant(s) is found. If multiple measured conditions occur on the same subplot, data will be collected for each condition separately.

When collected: Any condition class where (INVASIVE PLANT SAMPLING STATUS=1 and CONDITION CLASS STATUS=1) or (INVASIVE PLANT SAMPLING STATUS=2 and NONFOREST CONDITION CLASS STATUS=2).

Field width: 1 digit
Tolerance: No errors
Values: 1-9

11.2.6 SPECIES CODE (CORE OPTIONAL 9.9) [INVASIVE_PLOT_SPECIES.VEG_FLDSPD]

Record the code for any species listed in the invasive species list supplement that is found rooted in or overhanging (and rooted out of) the measured condition within the subplot. Species codes must be the standardized codes in the Natural Resource Conservation Service (NRCS) PLANTS database January 2010 version maintained by the FIA IM group (USDA, NRCS. 2010. The PLANTS database [http://plants.usda.gov/plants]. National Plant Data Center, Baton Rouge, LA 70874-4490).

In many of the invasive plant ID guides used by FIA units, some species are grouped together in the ID descriptions, and it may be difficult to distinguish between them with the information provided. In addition, some plants may be hybrids of listed species. Enter the code for the most likely species in the group, or the first one in the group if you are not sure.

If a species is suspected of being a listed invasive but cannot be identified quickly and confidently, and the FIA unit's protocols require specimen collection, assign a NRCS PLANTS unknown code. A subset of acceptable unknown codes that can be used is listed below. Collect a specimen unless the species is locally sparse. A species is "locally sparse" if five or fewer plants are present in the entire plot (4 subplots) and immediate surrounding area.

When collected: On all conditions within subplots where INVASIVE PLANT SUBPLOT STATUS=1 and INVASIVE PLANT SAMPLING STATUS=1 or 2 and CONDITION CLASS STATUS=1 or NONFOREST CONDITION CLASS STATUS=2.

Field width: 8 alpha-numeric characters
Tolerance: No errors
Values: See list of unknown invasive below and invasive species list in Appendix 1

Unknown Code	Common Name
2FERN	Fern or Fern Ally
2FORB	Forb (herbaceous, not grass nor grass-like)
2FD	Forb, dicot
2FM	Forb, monocot
2GRAM	Graminoid (grass or grass-like)
2GA	Grass, annual
2GP	Grass, perennial
2GL	Grass-like, (sedges and rushes)
2PLANT	Plant
2SHRUB	Shrub (>.5m)
2SUBS	Subshrub (<.5m)
2TREE	Tree
2VH	Vine, herbaceous
2VW	Vine, woody

11.2.7 UNIQUE SPECIES NUMBER (CORE OPTIONAL 9.10) [INVASIVE_PLOT_SPECIES.UNIQUE_SP_NBR]

When any species code is entered for the first time on a plot, the UNIQUE SPECIES NUMBER assigned is "1". If more than one unidentified species is recorded that is described by the same unknown code, the next sequential number is assigned. If a previously-recorded unidentified species is encountered again elsewhere on the plot, the UNIQUE SPECIES NUMBER that corresponds to the earlier encountered specimen must be entered. For example, an unknown thistle and unknown hawkweed would both be given a species code of "2FORB" but would need to be given different UNIQUE SPECIES NUMBERs when measured.

When collected: All species records
Field width: 2 digits
Tolerance: No errors
Values: 1-99, assigned in sequential numbers

11.2.8 SPECIES CANOPY COVER (CORE OPTIONAL 9.11) [INVASIVE_SUBPLOT_SPP.COVER_PCT]

A rapid canopy cover estimate, to the nearest percent cover, is made for each species for all foliage across all layer heights. All vegetation and plant parts that are or were alive during the current growing season are included in the cover estimates (e.g. brown Canada thistle in late summer is counted, live buds on Russian olive in late fall are used to estimate crown cover).**Canopy cover is based on a vertically-projected polygon described by the outline of the foliage**, ignoring any normal spaces occurring between the leaves of plants (Daubenmire 1959[1]), and ignoring overlap among multiple layers of a species. Canopy cover estimates are only made for the area within each measured condition (for example, vegetation cover over-hanging a nonforest road condition is not included in the adjacent forested condition estimate.)

For each species, cover can never exceed 100 percent. Cover is estimated for each measured condition on the subplot separately. However, the foliage **cover is always estimated as a percent of an entire subplot**. For example, on a subplot with two sampled conditions, a species occurs with a cover equal to a circle with a radius of 7.6 feet on the full subplot, or 10 percent cover. On condition class number 1 it covers an area equal to a circle of 2.4 feet radius and is recorded as 1 percent cover. The remainder, 9 percent cover, is recorded for condition number 2. If the species is only present on condition class number 1 with an area equal to a circle of 2.4-feet radius it is recorded as 1 percent. The proportion of the subplot in each condition does not matter.

If cover is greater than 0 but less than 1.5 percent, record as 1 percent cover. For species of moderate cover, it may be easiest to divide the subplots into quarters, estimate canopy cover of each quarter separately, and then add them together. The following area-cover sizes may be useful in developing estimates for an entirely forested subplot:

Subplot radius = 24.0 feet, Subplot area = 1809 ft^2			
Cover	Area (ft^2)	Length of a side of a square(ft)	Radius of circular area(ft)
1%	18	4.3	2.4
3%	54	7.4	4.1
5%	90	9.5	5.3
10%	181	13.4	7.6
20%	362	19	10.7

When collected: All species records
Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
Values: 001 to 100

[1] Daubenmire. R. 1959. A canopy-coverage method of vegetational analysis. Northwest Science 33(1): 43-64.

11.2.9 INVASIVE SPECIMEN COLLECTED (CORE OPTIONAL 9.13)
[INVASIVE_PLOT_SPECIES.SPECIMEN_COLLECTED]

Record if a specimen was collected for each species or unknown code. If the record is an unknown code, your unit requires specimen collection, and a plant specimen is not collected, describe the reason it was not collected in INVASIVE PLANT NOTES.

When collected: Each record where INVASIVES PLANT SUBPLOT STATUS=1, INVASIVE PLANT SPECIMEN COLLECTION RULE = 1, and an unknown SPECIES CODE was used.
Field width: 1 digit
Tolerance: No errors

Values:

0	No, a specimen was not officially collected
1	Yes, a specimen was officially collected

11.2.10 SPECIMEN LABEL NUMBER (CORE OPTIONAL 9.14)
[INVASIVE_PLOT_SPECIES.SPECIMEN_LABEL_NBR]

Record the label number for the collected specimen. Where plant specimen collection is required, numbered labels are provided to each crew.

When collected: Where INVASIVE SPECIMEN COLLECTED=1
Field width: 5 digits
Tolerance: No errors
Values: 1 to 99999, as pre-printed and assigned by FIA unit.

11.2.11 INVASIVE PLANT NOTES (CORE OPTIONAL 9.15)
[INVASIVE_PLOT_SPECIES.NOTES]

Notes are **required** for each species record with an unknown code. Enter text that describes the species or that explains why it was not collected if collection was required but not done. This text may be used on the specimen label and any spreadsheet used to track specimens.

When collected: As needed: Required for each record with an unknown code and SPECIMEN LABEL NUMBER.
Field width: 2000 characters
Tolerance: N/A
Values: English language words, phrases, and numbers

11.2.12 INVASIVE PLANTS SPECIES LIST

Appendix 1 Tree Species Lists

PACIFIC ISLAND TREE LIST (Ordered by Number)		
Number	NRCS Code	Scientific Name
50	CUPRE	Cupressus spp.
100	PINUS	Pinus spp.
299	2TE	Tree conifer
300	ACACI	Acacia spp.
303	ACFA	Acacia farnesiana
341	AIAL	Ailanthus altissima
350	ALNUS	Alnus spp.
460	CELTI	Celtis spp.
510	EUCAL	Eucalyptus spp.
511	EUGL	Eucalyptus globulus
512	EUCA2	Eucalyptus camaldulensis
513	EUGR12	Eucalyptus grandis
514	EURO2	Eucalyptus robusta
520	DIOSP	Diospyros spp.
541	FRAM2	Fraxinus americana
681	MOAL	Morus alba
712	PATO2	Paulownia tomentosa
715	MAPA28	Maytenus palauica
718	OSTR	Osmoxylon truncatum
720	PERSE	Persea spp.
755	PROSO	Prosopis spp.
764	PRPE3	Prunus persica
800	QUERC	Quercus spp.
855	CASUA	Casuarina spp.
856	CAGL11	Casuarina glauca
858	CICA	Cinnamomum camphora
860	CITRU2	Citrus spp.
865	COSE2	Cordia sebestena
885	MAIN3	Mangifera indica
887	PIPI3	Piscidia piscipula
888	SCAC2	Schefflera actinophylla
896	SYCU	Syzygium cumini
896	SYCU	Syzygium cumini
897	TAIN2	Tamarindus indica
908	CONU	Cocos nucifera

Number	NRCS Code	Scientific Name
940	SWMA2	Swietenia mahagoni
974	ULPU	Ulmus pumila
987	COER2	Conocarpus erectus
989	RHMA2	Rhizophora mangle
992	MEQU	Melaleuca quinquenervia
993	MEAZ	Melia azedarach
994	TRSE6	Triadica sebifera
998	2TB	Tree hardwood
999		Tree unknown
999	2TREE	Tree unknown
6002	ACAN10	Acacia aneura
6003	ACAU	Acacia auriculiformis
6004	ACCO	Acacia confusa
6006	ACKO	Acacia koa
6007	ACKO2	Acacia koaia
6009	ACMA12	Acacia mangium
6010	ACME80	Acacia mearnsii
6011	ACME	Acacia melanoxylon
6014	ACPA81	Acacia parramattensis
6028	ADPA	Adenanthera pavonina
6029	ADENA	Adenanthera spp.
6042	AGMA14	Aglaia mariannensis
6043	AGPA19	Aglaia palauensis
6044	AGPO4	Aglaia ponapensis
6046	AGSA9	Aglaia samoensis
6047	AGLAI	Aglaia spp.
6048	AICO2	Aidia cochinchinensis
6049	AIRA2	Aidia racemosa
6051	AILAN	Ailanthus spp.
6057	ALCH2	Albizia chinensis
6058	ALFA5	Albizia falcataria
6059	ALLE	Albizia lebbeck
6061	ALRE	Albizia retusa
6062	ALSA10	Albizia saponaria
6063	ALBIZ	Albizia spp.
6069	ALMA	Alectryon macrococcus
6069	ALMA	Alectryon macrococcus
6072	ALSA12	Elattostachys falcata
6073	ALECT	Alectryon spp.
6075	ALMO2	Aleurites moluccana

Number	NRCS Code	Scientific Name
6075	ALMO2	Aleurites moluccana
6077	ALEUR	Aleurites spp.
6078	ALTR11	Aleurites trisperma
6083	ALLOP	Allophylus spp.
6084	ALTE13	Allophylus ternatus
6084	ALTE13	Allophylus triphyllus
6085	ALTI2	Allophylus timorensis
6086	ALNE2	Alnus nepalensis
6088	ALCA21	Alphitonia carolinensis
6089	ALPO3	Alphitonia ponderosa
6090	ALPHI	Alphitonia spp.
6091	ALZI	Alphitonia zizyphoides
6095	ALMA16	Alstonia macrophylla
6096	ALPA22	Alstonia pacifica
6097	ALSTO	Alstonia spp.
6107	ANOC	Anacardium occidentale
6109	ANIN13	Anacolosa insularis
6118	ANEV	Angiopteris evecta
6124	ANCH9	Annona cherimola
6128	ANMU2	Annona muricata
6129	ANRE	Annona reticulata
6130	ANNON	Annona spp.
6131	ANSQ	Annona squamosa
6135	ANKA	Antidesma kapuae
6137	ANBU3	Antidesma bunius
6138	ANKU3	Antidesma kusaiense
6139	ANPL2	Antidesma platyphyllum
6139	ANPL2	Antidesma platyphyllum
6142	ANPO8	Antidesma ponapense
6143	ANPU2	Antidesma pulvinatum
6144	ANSP14	Antidesma sphaerocarpum
6145	ANTID	Antidesma spp.
6148	ANIN2	Antirhea inconspicua
6154	ARAN15	Araucaria angustifolia
6155	ARCO32	Araucaria columnaris
6156	AREX4	Araucaria excelsa
6157	ARHE12	Araucaria heterophylla
6158	ARAUC2	Araucaria spp.
6159	ARAL	Archontophoenix alexandrae
6161	AREL4	Ardisia elliptica

Number	NRCS Code	Scientific Name
6166	ARDIS	Ardisia spp.
6167	ARCA41	Areca catechu
6169	ARPI6	Arenga pinnata
6171	ARAL7	Artocarpus altilis
6173	ARHE2	Artocarpus heterophyllus
6175	ARMA28	Artocarpus mariannensis
6176	ARNO	Artocarpus nobilis
6177	AROD2	Artocarpus odoratissimus
6178	ARTOC	Artocarpus spp.
6179	ARBR11	Arytera brackenridgei
6181	ASDI14	Ascarina diffusa
6185	ASNA10	Astronidium navigatorum
6186	ASPA37	Astronidium palauense
6187	ASPI11	Astronidium pickeringii
6188	ASSA23	Astronidium samoense
6189	ASTRO4	Astronidium spp.
6190	ASSU31	Astronidium subcordata
6193	ATRA2	Atuna racemosa
6197	AVBI	Averrhoa bilimbi
6198	AVCA	Averrhoa carambola
6199	AVERR	Averrhoa spp.
6200	AVAL	Avicennia alba
6200	AVAL	Avicennia marina subsp. Marina
6203	AVMA3	Avicennia marina
6203	AVMA3	Avicennia marina
6205	AVICE	Avicennia spp.
6208	BATA	Baccaurea taitensis
6213	BAPA8	Badusa palauensis
6215	BAMBU	Bambusa spp.
6216	BAVU2	Bambusa vulgaris
6220	BAAS3	Barringtonia asiatica
6221	BARA5	Barringtonia racemosa
6222	BASA9	Barringtonia samoensis
6223	BARRI	Barringtonia spp.
6225	BABI6	Bauhinia binata
6226	BAMO2	Bauhinia monandra
6230	BAUHI	Bauhinia spp.
6236	BIJA	Bischofia javanica
6237	BISCH	Bischofia spp.

Number	NRCS Code	Scientific Name
6238	BIOR	Bixa orellana
6239	BIXA	Bixa spp.
6242	BOBR3	Bobea brevipes
6243	BOEL3	Bobea elatior
6244	BOSA2	Bobea sandwicensis
6245	BOBEA	Bobea spp.
6246	BOTI	Bobea timonioides
6247	BOFR2	Bocconia frutescens
6248	BOCCO	Bocconia spp.
6250	BOVI7	Boehmeria virgata
6260	BRAR6	Broussaisia arguta
6262	BRPA4	Broussonetia papyrifera
6264	BRCA12	Brugmansia candida
6267	BRPA15	Bruguiera parviflora
6268	BRSE11	Bruguiera gymnorhiza
6268	BRSE11	Bruguiera sexangula
6269	BRUGU	Bruguiera spp.
6277	BUEN	Buchanania engleriana
6278	BUME4	Buchanania merrillii
6279	BUPA16	Buchanania palawensis
6280	BUCHA	Buchanania spp.
6286	BUAS	Buddleja asiatica
6299	BURI3	Burckella richii
6318	CAKA5	Caesalpinia kavaiensis
6320	CASA28	Caesalpinia sappan
6341	CAIN4	Calophyllum inophyllum
6342	CANE31	Calophyllum neo-ebudicum
6343	CAPE15	Calophyllum pelewense
6344	CASO12	Calophyllum soulattri
6345	CALOP	Calophyllum spp.
6346	CAPR	Calotropis procera
6347	CALOT	Calotropis spp.
6366	CABR18	Campnosperma brevipetiolatum
6370	CAOD	Cananga odorata
6372	CAHA39	Canarium mafoa
6373	CAHI14	Canarium hirsutum
6374	CAIN42	Canarium indicum
6375	CAOV7	Canarium ovatum
6377	CANAR2	Canarium spp.

Number	NRCS Code	Scientific Name
6378	CAVI26	Canarium vitiense
6381	CAME35	Psydrax merrillii
6395	CAPA23	Carica papaya
6396	CARIC	Carica spp.
6397	CARE22	Carmona retusa
6398	CARMO	Carmona spp.
6399	CAMI36	Caryota mitis
6400	CARYO	Caryota spp.
6401	CAUR3	Caryota urens
6405	CACA28	Casearia cauliflora
6408	CASEA	Casearia spp.
6415	CAFI3	Cassia fistula
6417	CAGR11	Cassia grandis
6418	CAJA3	Cassia javanica
6420	CASI4	Cassia siamea
6422	CASSI	Cassia spp.
6430	CAEL5	Castilla elastica
6433	CACU8	Casuarina cunninghamiana
6434	CAEQ	Casuarina equisetifolia
6437	CALI8	Casuarina litorea
6439	CALO8	Catalpa longissima
6441	CEOB	Cecropia obtusifolia
6444	CECRO	Cecropia spp.
6445	CEOD	Cedrela odorata
6449	CEPE2	Ceiba pentandra
6452	CEPA6	Celtis paniculata
6459	CEDI12	Cerbera dilatata
6460	CEFL2	Cerbera floribunda
6461	CEMA20	Cerbera manghas
6462	CEOD2	Cerbera odollam
6463	CERBE	Cerbera spp
6469	CEHI3	Cereus hildmannianus
6470	CEREU	Cereus spp.
6472	CETA2	Ceriops tagal
6473	CEAU2	Cestrum aurantiacum
6474	CEDI6	Cestrum diurnum
6477	CENO	Cestrum nocturnum
6478	CESTR	Cestrum spp.
6482	CHAT2	Chamaesyce atrococca
6483	CHCE	Chamaesyce celastroides

Number	NRCS Code	Scientific Name
6492	CHHE3	Chamaesyce herbstii
6493	CHKU	Chamaesyce kuwaleana
6494	CHOL3	Chamaesyce olowaluana
6495	CHRO2	Chamaesyce rockii
6496	CHAMA15	Chamaesyce spp.
6497	CHDE3	Charpentiera densiflora
6498	CHEL	Charpentiera elliptica
6499	CHOB2	Charpentiera obovata
6500	CHOV2	Charpentiera ovata
6500	CHOV2	Charpentiera ovata
6503	CHARP	Charpentiera spp.
6504	CHTO3	Charpentiera tomentosa
6504	CHTO3	Charpentiera tomentosa
6507	CHDO3	Cheirodendron dominii
6508	CHFA	Cheirodendron fauriei
6509	CHFO4	Cheirodendron forbesii
6510	CHPL	Cheirodendron platyphyllum
6510	CHPL	Cheirodendron platyphyllum
6513	CHEIR	Cheirodendron spp.
6514	CHTR2	Cheirodendron trigynum
6514	CHTR2	Cheirodendron trigynum
6517	CHOA	Chenopodium oahuense
6518	CHENO	Chenopodium spp.
6525	CHVI22	Chionanthus vitiensis
6541	CHCA10	Chrysophyllum cainito
6542	CHOL	Chrysophyllum oliviforme
6545	CIHE7	Cibotium heleniae
6546	CICH	Cibotium chamissoi
6547	CIGL	Cibotium glaucum
6548	CIME8	Cibotium menziesii
6549	CIBOT	Cibotium spp.
6552	CIPU	Cinchona pubescens
6553	CINCH	Cinchona spp.
6555	CIBU2	Cinnamomum burmannii
6557	CICA2	Cinnamomum carolinense
6561	CIPE6	Cinnamomum pedatinervium
6562	CISE2	Cinnamomum sessilifolium
6563	CINNA2	Cinnamomum spp.
6564	CIVE2	Cinnamomum verum
6565	CICA8	Citharexylum caudatum

Number	NRCS Code	Scientific Name
6567	CISP3	Citharexylum spinosum
6568	CITHA	Citharexylum spp.
6570	CISA2	Citronella samoensis
6572	CIAU	Citrus aurantifolia
6574	CIAU8	Citrus aurantium
6575	CILI5	Citrus limon
6577	CISI3	Citrus sinensis
6578	CIGR	Citrus grandis
6579	CIHY2	Citrus hystrix
6580	CIMA10	Citrus macroptera
6581	CIMA5	Citrus maxima
6582	CIME3	Citrus medica
6583	CIMI3	Citrus mitis
6584	CIRE3	Citrus reticulata
6586	CLCA15	Claoxylon carolinianum
6588	CLFA6	Claoxylon fallax
6589	CLLO5	Claoxylon longiracemosum
6590	CLMA25	Claoxylon marianum
6591	CLSA	Claoxylon sandwicense
6592	CLAOX	Claoxylon spp.
6593	CLCA18	Cleistanthus carolinianus
6594	CLIN8	Cleistanthus insularis
6595	CLEIS5	Cleistanthus spp.
6596	CLLE3	Clermontia leptoclada
6597	CLAR4	Clermontia arborescens
6601	CLCL	Clermontia clermontioides
6604	CLDR2	Clermontia drepanomorpha
6605	CLFA	Clermontia fauriei
6606	CLGR3	Clermontia grandiflora
6610	CLHA4	Clermontia hawaiiensis
6611	CLKA	Clermontia kakeana
6612	CLKO	Clermontia kohalae
6613	CLLI3	Clermontia lindseyana
6614	CLMI3	Clermontia micrantha
6615	CLMO5	Clermontia montis-loa
6616	CLOB2	Clermontia oblongifolia
6620	CLPA6	Clermontia pallida
6621	CLPA8	Clermontia parviflora
6622	CLPE2	Clermontia peleana
6625	CLPE3	Clermontia persicifolia

Number	NRCS Code	Scientific Name
6626	CLPY2	Clermontia pyrularia
6627	CLSI3	Clermontia singuliflora
6628	CLERM	Clermontia spp.
6629	CLTU2	Clermontia tuberculata
6630	CLWA2	Clermontia waimeae
6632	CLCH4	Clerodendrum chinense
6633	CLGL2	Clerodendrum glabrum
6634	CLIN	Clerodendrum indicum
6635	CLMA24	Clerodendrum macrostegium
6636	CLERO2	Clerodendrum spp.
6651	CLRO	Clusia rosea
6652	CLUSI	Clusia spp.
6670	COUV	Coccoloba uvifera
6681	COCOS	Cocos spp.
6684	COAR2	Coffea arabica
6686	COLI8	Coffea liberica
6687	COFFE	Coffea spp.
6691	COSC13	Colona scabra
6693	COAR3	Colubrina arborescens
6694	COAS3	Colubrina asiatica
6697	COOP	Colubrina oppositifolia
6699	COLUB	Colubrina spp.
6702	COTE15	Combretum tetralophum
6703	COBA17	Commersonia bartramia
6709	CONOC	Conocarpus spp.
6716	COFO2	Coprosma foliosa
6717	COKA	Coprosma kauensis
6718	COLO4	Coprosma longifolia
6719	COMO3	Coprosma montana
6720	COOC3	Coprosma ochracea
6721	COPU8	Coprosma pubens
6722	CORH	Coprosma rhynchocarpa
6724	COPRO	Coprosma spp.
6726	COWA4	Coprosma waimeae
6729	COAS6	Cordia aspera
6731	COCO5	Cordia collococca
6733	CODI18	Cordia dichotoma
6736	COMI6	Cordia micronesica
6741	CORDI	Cordia spp.
6742	COSU2	Cordia subcordata

Number	NRCS Code	Scientific Name
6744	COFR2	Cordyline fruticosa
6745	CORDY2	Cordyline spp.
6749	COCA48	Corymbia calophylla
6750	COCI4	Corymbia citriodora
6751	COFI7	Corymbia ficifolia
6752	COGU4	Corymbia gummifera
6754	COLA6	Corynocarpus laevigatus
6755	CORYN2	Corynocarpus spp.
6756	COGU3	Couroupita guianensis
6758	CRRE12	Crateva religiosa
6760	CRAL11	Crescentia alata
6769	CRBI9	Crossostylis biflora
6771	CRLO3	Crotalaria longirostrata
6778	CROR5	Cryptocarya oreophila
6779	CREL8	Cryptocarya elegans
6781	CRMA8	Cryptocarya mannii
6783	CRYPT2	Cryptocarya spp.
6784	CRTU4	Cryptocarya turbinata
6786	CRJA3	Cryptomeria japonica
6787	CRYPT4	Cryptomeria spp.
6795	CULU2	Cupressus lusitanica
6796	CUSE2	Cupressus sempervirens
6800	CYAC4	Cyanea aculeatiflora
6801	CYAR10	Cyanea arborea
6802	CYFI6	Cyanea fissa
6805	CYFL4	Cyanea floribunda
6806	CYGI5	Cyanea giffardii
6807	CYHA6	Cyanea hamatiflora
6810	CYHA7	Cyanea hardyi
6811	CYHO6	Cyanea horrida
6812	CYKU3	Cyanea kuhihewa
6813	CYKU	Cyanea kunthiana
6814	CYLE5	Cyanea leptostegia
6815	CYMA10	Cyanea macrostegia
6818	CYMA14	Cyanea marksii
6819	CYPI4	Cyanea pilosa
6822	CYPO5	Cyanea pohaku
6823	CYPR8	Cyanea procera
6824	CYPY	Cyanea pycnocarpa
6825	CYQU	Cyanea quercifolia

Number	NRCS Code	Scientific Name
6826	CYRI4	Cyanea rivularis
6827	CYSO2	Cyanea solenocalyx
6828	CYANE	Cyanea spp.
6829	CYST5	Cyanea stictophylla
6830	CYSU8	Cyanea superba
6833	CYTR6	Cyanea tritomantha
6837	CYCO18	Cyathea cooperi
6838	CYDE16	Cyathea decurrens
6840	CYLU5	Cyathea lunulata
6841	CYME12	Cyathea medullaris
6842	CYNI7	Cyathea nigricans
6844	CYPO11	Cyathea ponapeana
6847	CYATH	Cyathea spp.
6849	CYTR11	Cyathea truncata
6852	CYCI3	Cycas circinalis
6852	CYCI3	Cycas micronesica
6853	CYRE11	Cycas revoluta
6854	CYCAS	Cycas spp.
6855	CYBA7	Cyclophyllum barbatum
6858	CYRA8	Cynometra ramiflora
6860	CYBE3	Cyphomandra betacea
6863	CYPU13	Cyrtandra pulchella
6864	CYRA3	Cyrtandra ramosissima
6865	CYGI3	Cyrtandra giffardii
6866	CYRTA	Cyrtandra spp.
6875	DEFA	Delissea fallax
6876	DELA4	Delissea laciniata
6877	DENI	Delissea niihauensis
6880	DEPA9	Delissea parviflora
6881	DELIS	Delissea spp.
6882	DEUN2	Delissea undulata
6883	DERE	Delonix regia
6884	DELON	Delonix spp.
6885	DEHA5	Dendrocnide harveyi
6886	DELA13	Dendrocnide latifolia
6887	DENDR16	Dendrocnide spp.
6891	DIAL13	Dictyosperma album
6898	DISU11	Dillenia suffruticosa
6900	DIBL3	Diospyros blancoi
6902	DIDI9	Diospyros discolor

Number	NRCS Code	Scientific Name
6903		Diospyros ebenum
6903	DIEB	Diospyros ebenaster
6904	DIEL3	Diospyros elliptica
6905	DIFE5	Diospyros ferrea
6906	DIHI4	Diospyros hillebrandii
6907	DIKA2	Diospyros kaki
6910	DISA16	Diospyros samoensis
6911	DISA10	Diospyros sandwicensis
6921	DIPO	Discocalyx ponapensis
6927	DOVI	Dodonaea viscosa
6928	DOSP3	Dolichandrone spathacea
6930	DOHE2	Dovyalis hebecarpa
6933	DRMU2	Dracaena multiflora
6941	DRNI3	Drypetes nitida
6942	DRYPE	Drypetes spp.
6943	DRVI5	Drypetes vitiensis
6944	DUDE	Dubautia demissifolia
6945	DUFA2	Dubautia fallax
6946	DUMO2	Dubautia montana
6947	DUAR	Dubautia arborea
6948	DUKN	Dubautia knudsenii
6952	DUMI	Dubautia microcephala
6953	DUPL	Dubautia plantaginea
6957	DURE2	Dubautia reticulata
6958	DUBAU	Dubautia spp.
6961	DUER	Duranta erecta
6965	DUZI	Durio zibethinus
6966	DYLU	Dypsis lutescens
6968	DYHU2	Dysoxylum huntii
6969	DYMA	Dysoxylum maota
6970	DYSA	Dysoxylum samoense
6971	DYSOX	Dysoxylum spp.
6973	ELGU	Elaeis guineensis
6975	ELBI	Elaeocarpus bifidus
6976	ELCA20	Elaeocarpus carolinensis
6977	ELFL6	Elaeocarpus floridanus
6978	ELGR	Elaeocarpus graeffei
6979	ELGR6	Elaeocarpus grandis
6980	ELJO	Elaeocarpus joga
6981	ELKE	Elaeocarpus kerstingianus

Number	NRCS Code	Scientific Name
6982	ELKU	Elaeocarpus kusanoi
6983	ELAEO	Elaeocarpus spp.
6984	ELTO4	Elaeocarpus tonganus
6985	ELUL	Elaeocarpus ulianus
6990	ELFA3	Elattostachys falcata
6990	ELFA3	Elattostachys falcata
6992	ELDU3	Eleocharis dulcis
6994	ENEL	Endiandra elaeocarpa
6996	ENCY	Enterolobium cyclocarpum
6998	ERJA3	Eriobotrya japonica
6999	ERIOB	Eriobotrya spp.
7008	ERFU2	Erythrina fusca
7012	ERSA11	Erythrina sandwicensis
7013	ERYTH	Erythrina spp.
7014	ERSU15	Erythrina subumbrans
7016	ERVAO	Erythrina variegata
7017	ERAC10	Erythrospermum acuminatissimum
7025	EUBO2	Eucalyptus botryoides
7026	EUBR2	Eucalyptus bridgesiana
7028	EUCI80	Eucalyptus cinerea
7030	EUCL	Eucalyptus cladocalyx
7031	EUCO3	Eucalyptus cornuta
7032	EUCR	Eucalyptus crebra
7033	EUDE	Eucalyptus deanei
7034	EUDE2	Eucalyptus deglupta
7038	EUGO	Eucalyptus gomphocephala
7039	EUGO2	Eucalyptus goniocalyx
7041	EUHE12	Eucalyptus hemiphloia
7044	EUMA4	Eucalyptus marginata
7045	EUMI	Eucalyptus microcorys
7046	EUPA	Eucalyptus paniculata
7047	EUPI	Eucalyptus pilularis
7048	EURA4	Eucalyptus raveretiana
7049	EURE2	Eucalyptus resinifera
7051	EURU2	Eucalyptus rudis
7052	EUSA17	Eucalyptus salicifolia
7053	EUSA	Eucalyptus saligna
7054	EUSI2	Eucalyptus sideroxylon
7056	EUTE	Eucalyptus tereticornis

Number	NRCS Code	Scientific Name
7057	EUVI	Eucalyptus viminalis
7059	EUAQ	Eugenia aquea
7065	EUCA16	Eugenia caryophyllus
7078	EUJA4	Eugenia javanica
7079	EUKO	Eugenia koolauensis
7082	EUMA5	Eugenia malaccensis
7086	EUNI2	Eugenia nitida
7087	EUPA3	Eugenia palauensis
7088	EUPA28	Eugenia palumbis
7091	EURE7	Eugenia reinwardtiana
7096	EUGEN	Eugenia spp.
7099	EUST24	Eugenia stelechantha
7101	EUSU9	Eugenia suzukii
7102	EUTH4	Eugenia thompsonii
7104	EUUN2	Eugenia uniflora
7110	EUHA2	Euphorbia haeleeleana
7112	EUNE4	Euphorbia neriifolia
7114	EUPU9	Euphorbia pulcherrima
7115	EUPHO	Euphorbia spp.
7116	EUTI	Euphorbia tirucalli
7117	EULO7	Euphoria longana
7119	EUSA6	Eurya sandwicensis
7120	EURYA	Eurya spp.
7123	EUHO5	Euodia hortensis
7124	EUNI8	Euodia nitida
7125	EUPA29	Euodia palawensis
7126	EUPO15	Euodia ponapensis
7127	EUODI	Euodia spp.
7128	EUTR13	Euodia trichantha
7129	EXAG	Excoecaria agallocha
7131	EXGA	Exocarpos gaudichaudii
7132	EXOCA	Exocarpos spp.
7133	EXPO2	Exorrhiza ponapensis
7141	FABE	Fagraea berteroana
7142	FAKS	Fagraea ksid
7143	FAGRA	Fagraea spp.
7144	FAMO	Falcataria moluccana
7145	FALCA2	Falcataria spp.
7150	FIBE	Ficus benjamina
7151	FICA	Ficus carica

Number	NRCS Code	Scientific Name
7155	FIEL	Ficus elastica
7156	FIGO	Ficus godeffroyi
7160	FIMI2	Ficus microcarpa
7162	FINO3	Ficus nota
7163	FIOB3	Ficus obliqua
7165	FIPR2	Ficus prolixa
7167	FIRU4	Ficus rubiginosa
7168	FISA	Ficus saffordii
7169	FISC3	Ficus scabra
7171	FICUS	Ficus spp.
7175	FITH2	Ficus thonningii
7176	FITI2	Ficus tinctoria
7178	FIUN	Ficus uniauriculata
7179	FIVI3	Ficus virens
7180	FICH	Finschia chloroxantha
7182	FISP3	Fitchia speciosa
7186	FLRU2	Flacourtia rukam
7188	FLBR	Flindersia brayleyana
7191	FLFL4	Flueggea flexuosa
7192	FLNE	Flueggea neowawraea
7193	FLUEG	Flueggea spp.
7200	FRCA12	Frangula californica
7206	FRUH	Fraxinus uhdei
7207	FUBO	Fuchsia boliviana
7208	FUPA2	Fuchsia paniculata
7209	FUCHS	Fuchsia spp.
7210	FUEL	Funtumia elastica
7211	PEAM3	Persea americana
7214	GAMA10	Garcinia mangostana
7215	GAMA8	Garcinia matsudai
7216	GAMY	Garcinia myrtifolia
7217	GAPO4	Garcinia ponapensis
7219	GARU3	Garcinia rumiyo
7221	GARCI	Garcinia spp.
7224	GABR	Gardenia brighamii
7225	GAMA6	Gardenia mannii
7226	GARE	Gardenia remyi
7227	GARDE	Gardenia spp.
7228	GATA	Gardenia taitensis
7229	GAFL8	Garuga floribunda

Number	NRCS Code	Scientific Name
7233	GERU3	Geniostoma rupestre
7241	GICE2	Gironniera celtidifolia
7245	GLSE2	Gliricidia sepium
7247	GLCU	Glochidion cuspidatum
7248	GLMA9	Glochidion marianum
7249	GLRA4	Glochidion ramiflorum
7250	GLOCH	Glochidion spp.
7251	GMEL	Gmelina elliptica
7252	GMPA	Gmelina palawensis
7253	GMELI	Gmelina spp.
7254	GNGN	Gnetum gnemon
7260	GOCA2	Goniothalamus carolinensis
7262	GOBA	Gossypium barbadense
7264	GOHIH2	Gossypium hirsutum
7272	GRBA	Grevillea banksii
7273	GRRO	Grevillea robusta
7274	GREVI	Grevillea spp.
7275	GRCR4	Grewia crenata
7279	GUOF	Guaiacum officinale
7282	GUMA4	Guamia mariannae
7307	GUSP3	Guettarda speciosa
7311	GURH	Guioa rhoifolia
7312	GUIOA	Guioa spp.
7313	GUPA	Gulubia palauensis
7319	GYAM2	Gyrocarpus americanus
7321	HACA2	Haematoxylum campechianum
7332	HAFL	Haplolobus floribundus
7334	HAAR4	Harpullia arborea
7338	HEDE14	Hedycarya denticulata
7340	HEDYC2	Hedycarya spp.
7343	HEFO5	Hedyotis fosbergii
7344	HEHI8	Hedyotis hillebrandii
7345	HEDYO2	Hedyotis spp.
7346	HETE21	Hedyotis terminalis
7349	HEPO4	Heliocarpus popayanensis
7350	HELIO	Heliocarpus spp.
7359	HELI9	Heritiera littoralis
7360	HELO12	Heritiera longipetiolata
7362	HERIT2	Heritiera spp.
7363	HEMO13	Hernandia moerenhoutiana

Number	NRCS Code	Scientific Name
7364	HENY	Hernandia nymphaeifolia
7365	HEOV4	Hernandia ovigera
7366	HESO	Hernandia sonora
7367	HERNA	Hernandia spp.
7368	HELA27	Hernandia labyrinthica
7370	HEAR9	Hesperomannia arborescens
7371	HEAR10	Hesperomannia arbuscula
7372	HELY	Hesperomannia lydgatei
7373	HESPE8	Hesperomannia spp.
7374	HEAR5	Heteromeles arbutifolia
7376	HETER5	Heteromeles spp.
7377	HEEL9	Heterospathe elata
7381	HEBR8	Hevea brasiliensis
7384	HIBO2	Hibiscadelphus bombycinus
7385	HICR	Hibiscadelphus crucibracteatus
7386	HIDI	Hibiscadelphus distans
7387	HIGI	Hibiscadelphus giffardianus
7388	HIHU	Hibiscadelphus hualalaiensis
7389	HIPU2	Hibiscadelphus puakuahiwi
7390	HIBIS	Hibiscadelphus spp.
7391	HIWI	Hibiscadelphus wilderianus
7392	HIWO	Hibiscadelphus woodii
7393	HIAR	Hibiscus arnottianus
7397	HIBR	Hibiscus brackenridgei
7401	HICA6	Hibiscus calyphyllus
7402	HICL	Hibiscus clayi
7403	HIEL	Hibiscus elatus
7404	HIKO	Hibiscus kokio
7407	HIMA5	Hibiscus macrophyllus
7408	HIMU3	Hibiscus mutabilis
7411	HIBIS2	Hibiscus spp.
7412	HITI	Hibiscus tiliaceus
7413	HIWA	Hibiscus waimeae
7424	HOWH	Homalium whitmeeanum
7427	HOAM2	Horsfieldia amklaal
7428	HONO2	Horsfieldia novoguineensis
7429	HONU2	Horsfieldia nunu
7430	HOPA10	Horsfieldia palauensis
7431	HORSF2	Horsfieldia spp.
7440	HYLOC	Hylocereus spp.
7441	HYUN3	Hylocereus undatus
7448	HYCA11	Hypericum canariense
7453	ILAN	Ilex anomala
7454	ILAQ80	Ilex aquifolium
7460	ILPA3	Ilex paraguariensis
7464	ILEX	Ilex spp.
7475	INFA3	Inocarpus fagifer
7477	INBI	Intsia bijuga
7482	JAMI	Jacaranda mimosifolia
7483	JACAR	Jacaranda spp.
7491	JACU2	Jatropha curcas
7494	JATRO	Jatropha spp.
7497	KAPA4	Kayea pacifica
7506	KLHO	Kleinhovia hospita
7509	KOCO2	Kokia cookei
7510	KODR	Kokia drynarioides
7511	KOKA	Kokia kauaiensis
7512	KOLA2	Kokia lanceolata
7513	KOKIA	Kokia spp.
7516	KUER	Kunzea ericoides
7517	KUNZE	Kunzea spp.
7518	LAFA2	Labordia fagraeoidea
7519	LAHE2	Labordia hedyosmifolia
7520	LAHI5	Labordia hirtella
7521	LAKA	Labordia kaalae
7522	LALY2	Labordia lydgatei
7523	LABOR	Labordia spp.
7524	LATI2	Labordia tinifolia
7528	LATR4	Labordia triflora
7529	LAWA3	Labordia waiolani
7533	LASP	Lagerstroemia speciosa
7539	LADO2	Lansium domesticum
7543	LALO	Latania loddigesii
7558	LEMO20	Leptospermum morrisonii
7559	LEPE23	Leptospermum petersonii
7560	LEPO22	Leptospermum polygalifolim
7561	LESC2	Leptospermum scoparium
7562	LEPTO4	Leptospermum spp.
7564	LEIN31	Leucaena insularum
7564	SCFO2	Schleinitzia fosbergii

Number	NRCS Code	Scientific Name
7565	LELE10	Leucaena leucocephala
7566	LEUCA	Leucaena spp.
7575	LISI	Ligustrum sinense
7576	LIGUS2	Ligustrum spp.
7583	LICH4	Litchi chinensis
7586	LISA8	Litsea samoensis
7587	LITSE	Litsea spp.
7588	LICH3	Livistona chinensis
7595	LOCO9	Lophostemon confertus
7598	LUNE4	Lucuma nervosa
7602	LULI8	Lumnitzera littorea
7614	MAIN8	Macadamia integrifolia
7616	MACAD	Macadamia spp.
7617	MATE16	Macadamia tetraphylla
7618	MACA25	Macaranga carolinensis
7619	MAGR	Macaranga grayana
7620	MAHA9	Macaranga harveyana
7621	MAMA28	Macaranga mappa
7623	MACAR	Macaranga spp.
7625	MAST7	Macaranga stipulosa
7626	MATA3	Macaranga tanarius
7627	MATH3	Macaranga thompsonii
7638	MAPA6	Mallotus palauensis
7639	MAPH4	Mallotus philippensis
7641	MALLO	Mallotus spp.
7642	MATI4	Mallotus tiliifolius
7653	MAGL12	Mammea glauca
7654	MAOD2	Mammea odorata
7655	MAMME	Mammea spp.
7657	MAMI3	Mangifera minor
7658	MAOD	Mangifera odorata
7659	MANGI	Mangifera spp.
7660	MAGL5	Manihot carthaginensis subsp. Glaziovii
7660	MAGL5	Manihot glaziovii
7661	MANIH	Manihot spp.
7664	MADI14	Manilkara dissecta
7666	MAHO5	Manilkara hoshinoi
7671	MANIL	Manilkara spp.
7672	MAUD	Manilkara udoido

Number	NRCS Code	Scientific Name
7674	MAZA	Manilkara zapota
7679	MACO	Maranthes corymbosa
7680	MAFR11	Marattia fraxinea
7700	MATH4	Maytenus thompsonii
7704	MECA21	Medusanthera carolinensis
7705	MESA11	Medusanthera samoensis
7706	MEDUS2	Medusanthera spp.
7709	MELAL	Melaleuca spp.
7710	MEMU10	Melanolepis multiglandulosa
7712	MECA9	Melastoma candidum
7713	MESA3	Melastoma sanguineum
7716	MELIA	Melia spp.
7719	MEAN3	Melicope anisata
7720	MEBA2	Melicope balloui
7721	MEBA3	Melicope barbigera
7722	MECH2	Melicope christophersenii
7723	MECI6	Melicope cinerea
7724	MECL	Melicope clusiifolia
7725	MECR5	Melicope cruciata
7726	MEEL2	Melicope elliptica
7727	MEHA7	Melicope haleakalae
7728	MEHA3	Melicope haupuensis
7729	MEHA4	Melicope hawaiensis
7730	MEHI6	Melicope hiiakae
7731	MEHO2	Melicope hosakae
7732	MEKA2	Melicope kaalaensis
7733	MEKN	Melicope knudsenii
7734	MEMA6	Melicope macropus
7735	MEMA7	Melicope makahae
7736	MEMO6	Melicope molokaiensis
7737	MEMU4	Melicope mucronulata
7738	MEOA	Melicope oahuensis
7739	MEOB4	Melicope obovata
7740	MEOR4	Melicope orbicularis
7741	MEOV	Melicope ovalis
7742	MEOV2	Melicope ovata
7743	MEPA6	Melicope pallida
7744	MEPA7	Melicope paniculata
7745	MEPE9	Melicope peduncularis
7746	MEPS	Melicope pseudoanisata

Number	NRCS Code	Scientific Name
7747	MEPU4	Melicope puberula
7748	MEQU3	Melicope quadrangularis
7749	MERA2	Melicope radiata
7750	MERE8	Melicope latifolia
7751	MERO3	Melicope rotundifolia
7752	MESA4	Melicope saint-johnii
7753	MESA5	Melicope sandwicensis
7754	MELIC3	Melicope spp.
7755	MEVO	Melicope volcanica
7756	MEWA2	Melicope waialealae
7757	MEWA4	Melicope wawraeana
7758	MEZA	Melicope zahlbruckneri
7759	MESA9	Melicytus samoensis
7766	MEAR16	Melochia aristata
7767	MELOC	Melochia spp.
7769	MEUM3	Melochia umbellata
7770	MEVIC4	Melochia villosissima var compacta
7771	MEVIV	Melochia villosissima var villosissima
7774	MEME12	Merrilliodendron megacarpum
7776	MEMA16	Meryta macrophylla
7777	MESE11	Meryta senfftiana
7778	MERYT	Meryta spp.
7781	MEPOP2	Metrosideros collina
7782	MEMA4	Metrosideros macropus
7783	MEPO5	Metrosideros polymorpha
7783	MEPO5	Metrosideros polymorpha
7792	MERU2	Metrosideros rugosa
7793	METRO	Metrosideros spp.
7794	METR5	Metrosideros tremuloides
7795	MEWA	Metrosideros waialealae
7798	MEAM4	Metroxylon amicarum
7799	MESA7	Metroxylon sagu
7800	METRO2	Metroxylon spp.
7801	MICH4	Michelia champaca
7805	MICA20	Miconia calvescens
7824	MIMI23	Micromelum minutum
7831	MIPI9	Millettia pinnata
7835	MIEL4	Mimusops elengi

Number	NRCS Code	Scientific Name
7841	MOHI	Montanoa hibiscifolia
7842	MONTA	Montanoa spp.
7845	MOCE2	Morella cerifera
7846	MOFA	Morella faya
7848	MOREL2	Morella spp.
7849	MOCI3	Morinda citrifolia
7850	MOLA12	Morinda latibractea
7851	MOPE2	Morinda pedunculata
7852	MORIN	Morinda spp.
7853	MOTR	Morinda trimera
7855	MOOL	Moringa oleifera
7865	MURA3	Munroidendron racemosum
7867	MUCA4	Muntingia calabura
7868	MUNTI	Muntingia spp.
7872	MUPA3	Musa paradisiaca
7873	MUCO8	Musa coccinea
7874	MUNA	Musa nana
7875	MUSA	Musa sapientum
7876	MUSA2	Musa spp.
7877	MUTE6	Musa textilis
7878	MUTI	Musa tikap
7879	MUTR2	Musa troglodytarum
7880	MUFR3	Mussaenda frondosa
7881	MURA5	Mussaenda raiateensis
7882	MUSSA	Mussaenda spp.
7883	MYSA	Myoporum sandwicense
7884	MYOPO	Myoporum spp.
7892	MYRCI	Myrcia spp.
7899	MYRU3	Myrica rubra
7900	MYRIC	Myrica spp.
7902	MYHY2	Myristica hypargyraea
7903	MYIN3	Myristica insularis
7904	MYRIS	Myristica spp.
7906	MYIN4	Myristica inutilis
7910	MYAL4	Myrsine alyxifolia
7913	MYDE2	Myrsine degeneri
7914	MYEM	Myrsine emarginata
7915	MYFE	Myrsine fernseei
7916	MYFO	Myrsine fosbergii
7918	MYHE3	Myrsine helleri

Number	NRCS Code	Scientific Name
7919	MYKA	Myrsine kauaiensis
7920	MYKN	Myrsine knudsenii
7921	MYLA3	Myrsine lanaiensis
7922	MYLE2	Myrsine lessertiana
7923	MYME2	Myrsine mezii
7924	MYPE3	Myrsine petiolata
7925	MYPU2	Myrsine pukooensis
7926	MYSA2	Myrsine sandwicensis
7927	MYRSI	Myrsine spp.
7928	MYWA	Myrsine wawraea
7942	NEOP	Neisosperma oppositifolia
7942	NEOP	Ochrosia oppositifolia
7948	NEFO2	Neonauclea forsteri
7952	NELA7	Nephelium lappaceum
7954	NEME5	Neraudia melastomifolia
7958	NEPO	Nesoluma polynesicum
7960	NESA2	Nestegis sandwicensis
7961	NESTE	Nestegis spp.
7962	NECE	Neuburgia celebica
7964	NIGL	Nicotiana glauca
7965	NICOT	Nicotiana spp.
7966	NOBR2	Nothocestrum breviflorum
7967	NOLA	Nothocestrum latifolium
7968	NOLO	Nothocestrum longifolium
7969	NOPE	Nothocestrum peltatum
7970	NOTHO3	Nothocestrum spp.
7971	NOHU	Nototrichium humile
7972	NOSA	Nototrichium sandwicense
7974	NYFR2	Nypa fruticans
7977	OCHNA	Ochna spp.
7978	OCTH	Ochna thomasiana
7980	OCPY	Ochroma pyramidale
7982	OCCO	Ochrosia compta
7983	OCHA	Ochrosia haleakalae
7984	OCKA	Ochrosia kauaiensis
7985	OCKI	Ochrosia kilaueaensis
7986	OCHRO2	Ochrosia spp.
7987	OCMA2	Ochrosia mariannensis
8000	OLNE	Oleandra neriiformis
8004	OLEU	Olea europaea

Number	NRCS Code	Scientific Name
8007	OLEA	Olea spp.
8008	HOAC4	Homalanthus acuminatus
8009	HONU3	Homalanthus nutans
8010	HOMAL6	Homalanthus spp.
8013	OPCO4	Opuntia cochenillifera
8014	OPFI	Opuntia ficus-indica
8015	OPMO5	Opuntia monacantha
8018	OPUNT	Opuntia spp.
8019	ORCA12	Ormosia calavensis
8022	OSOL	Osmoxylon oliveri
8023	OSPA	Osmoxylon pachyphyllum
8024	OSMOX	Osmoxylon spp.
8036	PAAQ2	Pachira aquatica
8044	PAST24	Palaquium stehlinii
8054	PAAI	Pandanus aimiriikensis
8055	PACO51	Pandanus cominsii
8056	PACO3	Pandanus compressus
8057	PACY10	Pandanus cylindricus
8058	PADI2	Pandanus dilatatus
8059	PADI29	Pandanus divergens
8060	PADU3	Pandanus dubius
8061	PADU4	Pandanus duriocarpus
8062	PAEN	Pandanus enchabiensis
8063	PAFI	Pandanus fischerianus
8064	PAFR7	Pandanus fragrans
8065	PAHO6	Pandanus hosinoi
8066	PAJA3	Pandanus jaluitensis
8067	PAKA2	Pandanus kanehirae
8068	PAKO2	Pandanus korrensis
8069	PALA3	Pandanus lakatwa
8070	PALA4	Pandanus laticanaliculatus
8071	PAMA3	Pandanus macrocephalus
8072	PAMA32	Pandanus macrojeanneretia
8073	PAME18	Pandanus menne
8074	PAKA	Palaquium karrak
8075	PAOD2	Pandanus odontoides
8076	PAPA38	Pandanus palawensis
8077	PAPA39	Pandanus patina
8078	PAPE	Pandanus peliliuensis
8079	PAPO2	Pandanus ponapensis

Number	NRCS Code	Scientific Name
8080	PAPU18	Pandanus pulposus
8081	PARE2	Pandanus rectangulatus
8082	PARE19	Pandanus reineckei
8083	PARO2	Pandanus rotundatus
8084	PANDA	Pandanus spp.
8085	PATE2	Pandanus tectorius
8086	PATO6	Pandanus tolotomensis
8087	PATR	Pandanus trukensis
8088	PAUT	Pandanus utilis
8090	PAVA4	Pandanus variegatus
8091	PAED4	Pangium edule
8092	PAOB7	Pandanus obliquus
8103	PAIN20	Parinari insularum
8104	PALA5	Parinari laurina
8105	PARIN	Parinari spp.
8107	PAKO5	Parkia korom
8108	PAPA2	Parkia parvifoliola
8111	PAAC3	Parkinsonia aculeata
8112	PARKI2	Parkinsonia spp.
8121	PEPT3	Peltophorum pterocarpum
8123	PEAC6	Pemphis acidula
8129	PEMO13	Pericopsis mooniana
8131	PESA3	Perrottetia sandwicensis
8151	PHCA13	Phoenix canariensis
8152	PHDA4	Phoenix dactylifera
8153	PHOEN2	Phoenix spp.
8154	PHSY3	Phoenix sylvestris
8155	PHDA5	Photinia davidiana
8157	PHAC3	Phyllanthus acidus
8159	PHDI10	Phyllanthus distichus
8175	PIDI2	Pimenta dioica
8178	PIRAG	Pimenta racemosa
8180	PIMEN	Pimenta spp.
8181	PIIN5	Pinanga insignis
8183	PICA18	Pinus caribaea
8187	PIPA13	Pinus patula
8188	PIPI6	Pinus pinaster
8205	PIAL2	Pipturus albidus
8206	PIAR8	Pipturus argenteus
8207	PIPTU	Pipturus spp.

Number	NRCS Code	Scientific Name
8210	PISCI	Piscidia spp.
8212	PIBR3	Pisonia brunoniana
8213	PIGR6	Pisonia grandis
8214	PISA5	Pisonia sandwicensis
8215	PISON	Pisonia spp.
8217	PIUM2	Pisonia umbellifera
8218	PIWA2	Pisonia wagneriana
8220	PIDU	Pithecellobium dulce
8224	PIMO4	Pittosporum monae
8226	PIAR4	Pittosporum argentifolium
8227	PICO4	Pittosporum confertiflorum
8228	PIFL4	Pittosporum flocculosum
8229	PIGA2	Pittosporum gayanum
8230	PIGL4	Pittosporum glabrum
8231	PIHA3	Pittosporum halophilum
8232	PIHA4	Pittosporum hawaiiense
8233	PIHO	Pittosporum hosmeri
8234	PIKA3	Pittosporum kauaiense
8235	PINA	Pittosporum napaliense
8236	PIPE8	Pittosporum pentandrum
8238	PITTO	Pittosporum spp.
8239	PITE5	Pittosporum terminalioides
8240	PIUN2	Pittosporum undulatum
8241	PIVI5	Pittosporum viridiflorum
8242	PLGA2	Planchonella garberi
8243	PLGR11	Planchonella grayana
8244	PLLI6	Planchonella linggensis
8246	PLSA9	Planchonella samoensis
8247	PLANC	Planchonella spp.
8248	PLTO2	Planchonella torricellensis
8250	PLRE4	Platydesma remyi
8251	PLSP3	Platydesma spathulata
8252	PLATY	Platydesma spp.
8257	PLAU2	Pleomele aurea
8258	PLAU5	Pleomele auwahiensis
8259	PLFE	Pleomele fernaldii
8260	PLFO2	Pleomele forbesii
8261	PLHA3	Pleomele halapepe
8262	PLHA4	Pleomele hawaiiensis
8263	PLEOM	Pleomele spp.

Number	NRCS Code	Scientific Name
8269	PLOBO	Plumeria obtusa
8271	PLRU2	Plumeria rubra
8272	PLUME	Plumeria spp.
8283	POGR28	Polyscias grandifolia
8286	PONO10	Polyscias nodosa
8287	POSA27	Polyscias samoensis
8288	POSC10	Polyscias scutellaria
8289	POLYS4	Polyscias spp.
8290	POPI12	Pometia pinnata
8292	POHO	Ponapea hosinoi
8293	POLE21	Ponapea ledermanniana
8294	PONAP	Ponapea spp.
8295	POPI4	Pongamia pinnata
8297	POCA43	Pouteria caimito
8298	POCA6	Pouteria calcarea
8299	POCA23	Pouteria campechiana
8303	POOB8	Planchonella obovata
8303	POOB8	Pouteria obovata
8304	POSA11	Pouteria sandwicensis
8305	POSA13	Pouteria sapota
8306	POUTE	Pouteria spp.
8307	PROB	Premna obtusifolia
8308	PRPU5	Premna pubescens
8309	PRSE6	Premna serratifolia
8310	PREMN	Premna spp.
8315	PRAF	Pritchardia affinis
8316	PRAR2	Pritchardia arecina
8317	PRBE	Pritchardia beccariana
8318	PRFO	Pritchardia forbesiana
8319	PRHA2	Pritchardia hardyi
8320	PRHI	Pritchardia hillebrandii
8321	PRKA	Pritchardia kaalae
8322	PRLA3	Pritchardia lanaiensis
8323	PRLA4	Pritchardia lanigera
8324	PRLI2	Pritchardia limahuliensis
8325	PRLO2	Pritchardia lowreyana
8326	PRMA5	Pritchardia martii
8327	PRMI3	Pritchardia minor
8328	PRMU3	Pritchardia munroi
8329	PRPA11	Pritchardia pacifica

Number	NRCS Code	Scientific Name
8330	PRPE7	Pritchardia perlmanii
8331	PRRE	Pritchardia remota
8336	PRSC	Pritchardia schattaueri
8337	PRITC	Pritchardia spp.
8338	PRVI2	Pritchardia viscosa
8339	PRWA	Pritchardia waialealeana
8341	PRPE6	Procris pedunculata
8343	PRJU	Prosopis juliflora
8344	PRPA4	Prosopis pallida
8355	PSCA	Psidium cattleianum
8356	PSGU	Psidium guajava
8365	PSFA	Psychotria fauriei
8366	PSGR	Psychotria grandiflora
8369	PSGR3	Psychotria greenwelliae
8370	PSHA2	Psychotria hathewayi
8373	PSHA3	Psychotria hawaiiensis
8377	PSHE2	Psychotria hexandra
8382	PSHEO	Psychotria hexandra ssp. oahuensis
8386	PSHO	Psychotria hobdyi
8387	PSIN10	Psychotria insularum
8388	PSKA	Psychotria kaduana
8390	PSYMAR	Psychotria mariana
8392	PSMA6	Psychotria mariniana
8393	PSMA7	Psychotria mauiensis
8398	PSRH2	Psychotria rhombocarpa
8399	PSRO2	Psychotria rotensis
8400	PSYCH	Psychotria spp.
8401	PSWA2	Psychotria wawrae
8402	PSOD	Psydrax odorata
8404	PTKA	Pteralyxia kauaiensis
8405	PTMA	Pteralyxia macrocarpa
8406	PTERA	Pteralyxia spp.
8407	PTIN2	Pterocarpus indicus
8412	PTLE3	Ptychococcus ledermannianus
8415	PTMA8	Ptychosperma macarthuri
8416	PTPA	Ptychosperma palauense
8418	PTYCH4	Ptychosperma spp.
8424	QUSU5	Quercus suber
8430	RAMY	Rapanea myricifolia

Number	NRCS Code	Scientific Name
8431	RAVO	Rauvolfia vomitoria
8432	RAIN8	Rauvolfia insularis
8434	RASA3	Rauvolfia sandwicensis
8435	RAUVO	Rauvolfia spp.
8436	RAMA7	Ravenala madagascariensis
8440	RELA	Reynoldsia lanutoensis
8442	RESA	Reynoldsia sandwicensis
8443	REYNO	Reynoldsia spp.
8456	RHED4	Rheedia edulis
8458	RHAP2	Rhizophora apiculata
8460	RHLA12	Rhizophora lamarckii
8462	RHMU	Rhizophora mucronata
8463	RHIZO	Rhizophora spp.
8464	RHST8	Rhizophora stylosa
8465	RHODO2	Rhodomyrtus spp.
8466	RHTO10	Rhodomyrtus tomentosa
8467	RHSA2	Rhus sandwicensis
8468	RHUS	Rhus spp.
8469	RHTA	Rhus taitensis
8472	RICO3	Ricinus communis
8473	RICIN	Ricinus spp.
8474	RICA16	Rinorea carolinensis
8480	RODE5	Rollinia deliciosa
8490	ROEL	Roystonea elata
8490	ROEL	Roystonea regia
8491	ROOL	Roystonea oleracea
8503	SAIN13	Samadera indica
8505	SASA10	Albizia saman
8505	SASA10	Samanea saman
8506	SAMAN	Samanea spp.
8509	SANIC4	Sambucus nigra
8510	SAMBU	Sambucus spp.
8515	SAKO4	Sandoricum koetjape
8516	SAEL2	Santalum ellipticum
8517	SAFR4	Santalum freycinetianum
8521	SAHA3	Santalum haleakalae
8522	SAPA7	Santalum paniculatum
8525	SASA8	Santalum salicifolium
8526	SANTA	Santalum spp.
8528	SAOA3	Sapindus oahuense

Number	NRCS Code	Scientific Name
8529	SASA4	Sapindus saponaria
8531	SAPIN	Sapindus spp.
8532	SAVI17	Sapindus vitiensis
8534	SAIN2	Sapium indicum
8544	SAPA35	Sarcopygme pacifica
8548	SCCE3	Scaevola cerasifolia
8549	SCCH3	Scaevola chamissoniana
8550	SCGA2	Scaevola gaudichaudiana
8551	SCPR	Scaevola procera
8552	SCAEV	Scaevola spp.
8555	SCHAE	Schaefferia spp.
8559	SCSA10	Schefflera samoensis
8560	SCTA	Scaevola taccada
8561	SCMO	Schinus molle
8563	SCTE	Schinus terebinthifolius
8563	SCTE	Schinus terebinthifolius
8577	SCHY5	Scyphiphora hydrophyllacea
8583	SEFL9	Securinega flexuosa
8586	SEVE4	Semecarpus venenosa
8588	SEAL4	Senna alata
8590	SEGA2	Senna gaudichaudii
8591	SEMU5	Senna multijuga
8592	SEPE4	Senna pendula
8595	SESE13	Senna septemtrionalis
8596	SESI3	Senna siamea
8598	SENNA	Senna spp.
8599	SESU10	Senna sulfurea
8600	SESU4	Senna surattensis
8601	SEKA2	Serianthes kanehirae
8603	SENE9	Serianthes nelsonii
8605	SEGR5	Sesbania grandiflora
8606	SESE8	Sesbania sesban
8607	SESBA	Sesbania spp.
8609	SIFA	Sida fallax
8610	SIDA	Sida spp.
8628	SOAM	Solanum americanum
8631	SOMA3	Solanum mauritianum
8635	SOLAN	Solanum spp.
8636	SOTO4	Solanum torvum
8639	SOAL10	Sonneratia alba

Number	NRCS Code	Scientific Name
8641	SOCH	Sophora chrysophylla
8642	SOPHO	Sophora spp.
8643	SOTO3	Sophora tomentosa
8644	SPCA2	Spathodea campanulata
8645	SPATH	Spathodea spp.
8646	SPSA7	Spiraeanthemum samoense
8649	SPDU3	Spondias dulcis
8650	SPMO	Spondias mombin
8653	SPOND	Spondias spp.
8655	STAM10	Stemonurus ammui
8656	SPPI4	Spondias pinnata
8665	STFA5	Sterculia fanaiho
8667	STPA20	Sterculia palauensis
8669	STAN9	Streblus anthropophagorum
8670	STPE3	Streblus pendulinus
8671	STREB	Streblus spp.
8676	SUMA2	Suriana maritima
8678	SWIET	Swietenia spp.
8679	SWMA	Swietenia macrophylla
8687	SYRA6	Symplocos racemosa
8689	SYGL	Syncarpia glomulifera
8690	SYNCA	Syncarpia spp.
8691	SYDU	Synsepalum dulcificum
8695	SYBR3	Syzygium brevifolium
8696	SYCA4	Syzygium carolinense
8697	SYCL	Syzygium clusiifolium
8699	SYDE3	Syzygium dealatum
8700	SYIN2	Syzygium inophylloides
8701	SYJA	Syzygium jambos
8702	SYMA2	Syzygium malaccense
8703	SYRI3	Syzygium richii
8704	SYSA3	Syzygium samarangense
8705	SYSA6	Syzygium samoense
8706	SYSA	Syzygium sandwicense
8708	SYZYG	Syzygium spp.
8714	TAPA10	Tabebuia pallida
8716	TARO	Tabebuia rosea
8718	TABEB	Tabebuia spp.
8719	TAAU3	Tabernaemontana aurantiaca
8722	TAPA13	Tabernaemontana pandacaqui

Number	NRCS Code	Scientific Name
8723	TARO3	Tabernaemontana rotensis
8737	TASA2	Tarenna sambucina
8741	TECA9	Tecoma castanifolia
8743	TEST	Tecoma stans
8744	TEGR	Tectona grandis
8745	TECTO	Tectona spp.
8748	TERMI	Terminalia spp.
8749	TECA16	Terminalia carolinensis
8750	TECA	Terminalia catappa
8751	TECR3	Terminalia crassipes
8752	TEED	Terminalia edulis
8755	TEKA4	Terminalia kaernbachii
8756	TEMY	Terminalia myriocarpa
8758	TERI3	Terminalia richii
8759	TESA2	Terminalia samoensis
8770	TEFL5	Tetraplasandra flynnii
8771	TEGY	Tetraplasandra gymnocarpa
8772	TEHA2	Tetraplasandra hawaiensis
8773	TEKA3	Tetraplasandra kavaiensis
8774	TEOA	Tetraplasandra oahuensis
8775	TETRA11	Tetraplasandra spp.
8776	TEWA	Tetraplasandra waialealae
8777	TEWA3	Tetraplasandra waimeae
8779	TEBI	Tetrazygia bicolor
8784	THCA	Theobroma cacao
8787	THPO3	Thespesia populnea
8788	THESP	Thespesia spp.
8789	THPE3	Thevetia peruviana
8804	TIBOU	Tibouchina spp.
8805	TIUR	Tibouchina urvilleana
8806	TICO7	Timonius corymbosus
8807	TIMO4	Timonius mollis
8808	TIMON	Timonius spp.
8809	TISU3	Timonius subauritus
8810	TITI	Timonius timon
8811	TOONA	Toona spp.
8812	TOCI	Toona ciliata
8822	TOLA	Touchardia latifolia
8823	TOUCH	Touchardia spp.
8824	TOAR2	Tournefortia argentea

Number	NRCS Code	Scientific Name
8826	TOURN	Tournefortia spp.
8827	TRCA33	Trema cannabina
8831	TROR	Trema orientalis
8832	TREMA	Trema spp.
8837	TRIK	Trichospermum ikutai
8838	TRLE8	Trichospermum ledermannii
8839	TRRI9	Trichospermum richii
8842	TRTR7	Triphasia trifolia
8846	TROB7	Tristiropsis obtusangula
8856	URGL	Urera glabra
8857	URKA	Urera kaalae
8858	URERA	Urera spp.
8866	VEME3	Adonidia merrillii
8866	VEME3	Veitchia merrillii
8869	VEMO3	Vernicia montana
8870	VERNI	Vernicia spp.
8872	VICO17	Vitex cofassus
8872	VICO17	Vitex cofassus
8874	VIPA6	Vitex parviflora
8875	VITEX	Vitex spp.
8876	VITR7	Vitex trifolia
8884	WEBI	Wedelia biflora
8886	WEAF	Weinmannia affinis
8889	WIBI	Wikstroemia bicornuta

Number	NRCS Code	Scientific Name
8890	WIFU	Wikstroemia furcata
8891	WIMO	Wikstroemia monticola
8892	WIOA	Wikstroemia oahuensis
8892	WIOA	Wikstroemia oahuensis
8895	WIPH2	Wikstroemia phillyreifolia
8896	WIPU	Wikstroemia pulcherrima
8897	WISA	Wikstroemia sandwicensis
8898	WISK	Wikstroemia skottsbergiana
8899	WIKST	Wikstroemia spp.
8900	WIVI	Wikstroemia villosa
8901	XIAM	Ximenia americana
8903	XYGR	Xylocarpus granatum
8904	XYMO2	Xylocarpus moluccensis
8905	XYLOC2	Xylocarpus spp.
8907	XYCR	Xylosma crenata
8908	XYHA	Xylosma hawaiiensis
8909	XYNE2	Xylosma nelsonii
8911	XYSA	Xylosma samoensis
8915	XYLOS	Xylosma spp.
8925	ZADI	Zanthoxylum dipetalum
8929	ZAHA	Zanthoxylum hawaiiense
8930	ZAKA	Zanthoxylum kauaense
8933	ZAOA	Zanthoxylum oahuense
8936	ZANTH	Zanthoxylum spp.
8939	ZIMA	Ziziphus mauritiana

Palau Trees By Tree Species Number				
Number	**Old Number**	**NRCS Code**	**Scientific Name**	**Common Name**
300	6016	ACACI	Acacia spp.	
460	1220	CELTI	Celtis spp.	
510	7055	EUCAL	Eucalyptus spp.	
511	213	EUGL	Eucalyptus globulus	
514	341	EURO2	Eucalyptus robusta	swampy mahogany
520	1350	DIOSP	Diospyros spp.	
715	715	MAPA28	Maytenus palauica	
718	718	OSTR	Osmoxylon truncatum	kesiamel
855	1210	CASUA	Casuarina spp.	
860	1250	CITRU2	Citrus spp.	bekersiu, cheritel
865	835	COSE2	Cordia sebestena	kalau, kelau
885	569	MAIN3	Mangifera indica	ledel, mango
896	65	SYCU	Syzygium cumini	
908	466	CONU	Cocos nucifera	lius, coconut
940	959	SWMA2	Swietenia mahagoni	mahogany
992	885	MEQU	Melaleuca quinquenervia	paperbark guava
6003	49	ACAU	Acacia auriculiformis	auri
6004	278	ACCO	Acacia confusa	ianangi
6028	400	ADPA	Adenanthera pavonina	telentundalel
6043	800	AGPA19	Aglaia palauensis	mesecheues
6047	1020	AGLAI	Aglaia spp.	
6048	101	AICO2	Aidia cochinchinensis	
6058	802	ALFA5	Albizia falcataria	ukall ra ngebard
6059	102	ALLE	Albizia lebbeck	
6061	803	ALRE	Albizia retusa	ukall ra ngebard
6063	1010	ALBIZ	Albizia spp.	
6083	1040	ALLOP	Allophylus spp.	
6084	804	ALTE13	Allophylus ternatus	chebeludes
6084	6084	ALTE13	Allophylus triphyllus	chebeludes
6085	408	ALTI2	Allophylus timorensis	ebeludes, chebeludes
6088	805	ALCA21	Alphitonia carolinensis	chelebiob, elebiong
6090	1050	ALPHI	Alphitonia spp.	
6118	806	ANEV	Angiopteris evecta	dermarm
6128	412	ANMU2	Annona muricata	sausab
6129	105	ANRE	Annona reticulata	ngel ra ngebard
6130	1060	ANNON	Annona spp.	
6131	413	ANSQ	Annona squamosa	ngel ra ngebard
6137	106	ANBU3	Antidesma bunius	jiam, siam

Palau Trees By Tree Species Number				
Number	Old Number	NRCS Code	Scientific Name	Common Name
6138	972	ANKU3	Antidesma kusaiense	
6142	6139	ANPO8	Antidesma ponapense	
6145	1070	ANTID	Antidesma spp.	
6156	111	AREX4	Araucaria excelsa	
6157	108	ARHE12	Araucaria heterophylla	norfolk island pine
6158	1080	ARAUC2	Araucaria spp.	
6167	417	ARCA41	Areca catechu	buuch, betel nut
6169	109	ARPI6	Arenga pinnata	
6171	293	ARAL7	Artocarpus altilis	arandu, meduu, breadfruit
6173	294	ARHE2	Artocarpus heterophyllus	baramits
6175	110	ARMA28	Artocarpus mariannensis	chebiei, mediuu liou
6176	295	ARNO	Artocarpus nobilis	
6178	1090	ARTOC	Artocarpus spp.	meduu
6186	807	ASPA37	Astronidium palauense	meskui
6189	1100	ASTRO4	Astronidium spp.	
6197	427	AVBI	Averrhoa bilimbi	imukurs, oterebekii
6198	428	AVCA	Averrhoa carambola	kemim, ourderteboteb
6199	1110	AVERR	Averrhoa spp.	
6200	707	AVAL	Avicennia alba	biut
6200	707	AVAL	Avicennia marina subsp. Marina	biut
6203	6204	AVMA3	Avicennia marina	
6205	1120	AVICE	Avicennia spp.	
6213	808	BAPA8	Badusa palauensis	ralm
6220	430	BAAS3	Barringtonia asiatica	bdull
6221	112	BARA5	Barringtonia racemosa	koranges
6223	1130	BARRI	Barringtonia spp.	
6225	809	BABI6	Bauhinia binata	
6226	113	BAMO2	Bauhinia monandra	Orchid tree
6230	1140	BAUHI	Bauhinia spp.	
6268	435	BRSE11	Bruguiera gymnorhiza	kodenges, denges
6268	435	BRSE11	Bruguiera sexangula	kodenges, denges
6277	810	BUEN	Buchanania engleriana	omail
6279	811	BUPA16	Buchanania palawensis	omail, deuachel
6280	1150	BUCHA	Buchanania spp.	
6341	440	CAIN4	Calophyllum inophyllum	btaches
6343	812	CAPE15	Calophyllum pelewense	chesemolech
6344	813	CASO12	Calophyllum soulattri	olebtaches, chesemolech
6345	1160	CALOP	Calophyllum spp.	

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Number	Old Number	NRCS Code	Scientific Name	Common Name
6366	814	CABR18	Campnosperma brevipetiolatum	kelela charm, kiu
6370	441	CAOD	Cananga odorata	irang, chirang
6373	815	CAHI14	Canarium hirsutum	mesecheues
6377	1170	CANAR2	Canarium spp.	
6395	448	CAPA23	Carica papaya	bobai, chebingel
6399	817	CAMI36	Caryota mitis	fish tail palm
6400	1180	CARYO	Caryota spp.	
6405	818	CACA28	Casearia cauliflora	keuert
6408	1190	CASEA	Casearia spp.	
6415	450	CAFI3	Cassia fistula	shower tree
6417	819	CAGR11	Cassia grandis	pink shower
6420	820	CASI4	Cassia siamea	kassod tree
6422	1200	CASSI	Cassia spp.	
6434	452	CAEQ	Casuarina equisetifolia	ngas, ironwood
6437	117	CALI8	Casuarina litorea	gagu,australian pine
6449	119	CEPE2	Ceiba pentandra	kalngebard
6452	821	CEPA6	Celtis paniculata	
6460	822	CEFL2	Cerbera floribunda	emeridech
6461	454	CEMA20	Cerbera manghas	emeridech
6463	6463	CERBE	Cerbera spp	
6472	708	CETA2	Ceriops tagal	biut
6541	457	CHCA10	Chrysophyllum cainito	kaimito, kemim, star apple
6557	823	CICA2	Cinnamomum carolinense	ochod
6561	824	CIPE6	Cinnamomum pedatinervium	ochod
6563	1240	CINNA2	Cinnamomum spp.	
6564	458	CIVE2	Cinnamomum verum	ochod ra ngebard, cinnamontree
6572	461	CIAU	Citrus aurantifolia	malchianged
6575	124	CILI5	Citrus limon	lemon, malchianged, debechel
6578	122	CIGR	Citrus grandis	siabong
6583	826	CIMI3	Citrus mitis	calamondin, kingkang
6584	463	CIRE3	Citrus reticulata	kerekur
6588	828	CLFA6	Claoxylon fallax	
6589	829	CLLO5	Claoxylon longiracemosum	
6592	1260	CLAOX	Claoxylon spp.	
6593	830	CLCA18	Cleistanthus carolinianus	
6594	831	CLIN8	Cleistanthus insularis	
6595	1270	CLEIS5	Cleistanthus spp.	
6622	6627	CLPE2	Clermontia peleana	

Palau Trees By Tree Species Number				
Number	Old Number	NRCS Code	Scientific Name	Common Name
6627	6632	CLSI3	Clermontia singuliflora	
6684	129	COAR2	Coffea arabica	kohi, coffee
6687	1280	COFFE	Coffea spp.	
6691	832	COSC13	Colona scabra	uab, chuchab
6702	833	COTE15	Combretum tetralophum	ochaol
6703	468	COBA17	Commersonia bartramia	eremallueang, chermallucheang
6736	834	COMI6	Cordia micronesica	
6741	1300	CORDI	Cordia spp.	
6742	472	COSU2	Cordia subcordata	baderirt, badrirs
6778	6786	CROR5	Cryptocarya oreophila	
6783	1310	CRYPT2	Cryptocarya spp.	
6840	691	CYLU5	Cyathea lunulata	eluu, tree fern, cheluu
6842	836	CYNI7	Cyathea nigricans	
6847	1320	CYATH	Cyathea spp.	
6847	481	CYATH	Cyathea spp.	
6852	134	CYCI3	Cycas circinalis	kokeal, remiang
6852	134	CYCI3	Cycas micronesica	kokeal, remiang
6853	838	CYRE11	Cycas revoluta	remiang
6854	1330	CYCAS	Cycas spp.	
6858	135	CYRA8	Cynometra ramiflora	kalengui, ketenguit
6883	485	DERE	Delonix regia	nangyo, nangiosikura
6902	487	DIDI9	Diospyros discolor	matib, velvet apple
6905	839	DIFE5	Diospyros ferrea	
6927	712	DOVI	Dodonaea viscosa	
6928	840	DOSP3	Dolichandrone spathacea	rríu
6933	713	DRMU2	Dracaena multiflora	
6941	842	DRNI3	Drypetes nitida	kevert
6942	1360	DRYPE	Drypetes spp.	
6971	1370	DYSOX	Dysoxylum spp.	
6973	843	ELGU	Elaeis guineensis	oil nut palm
6976	844	ELCA20	Elaeocarpus carolinensis	
6980	142	ELJO	Elaeocarpus joga	dekemerír
6983	1380	ELAEO	Elaeocarpus spp.	
7008	508	ERFU2	Erythrina fusca	roro
7013	1390	ERYTH	Erythrina spp.	
7016	510	ERVAO	Erythrina variegata	roro
7034	339	EUDE2	Eucalyptus deglupta	eucalyptus
7047	340	EUPI	Eucalyptus pilularis	

Palau Trees By Tree Species Number				
Number	Old Number	NRCS Code	Scientific Name	Common Name
7053	342	EUSA	Eucalyptus saligna	
7054	343	EUSI2	Eucalyptus sideroxylon	
7059	848	EUAQ	Eugenia aquea	edebsachel, chedebsachel
7065	849	EUCA16	Eugenia caryophyllus	cloves
7078	144	EUJA4	Eugenia javanica	rebotel
7082	145	EUMA5	Eugenia malaccensis	kidel
7086	850	EUNI2	Eugenia nitida	
7087	851	EUPA3	Eugenia palauensis	orenged
7091	512	EURE7	Eugenia reinwardtiana	kesiil
7096	1410	EUGEN	Eugenia spp.	
7101	852	EUSU9	Eugenia suzukii	rebotel
7124	855	EUNI8	Euodia nitida	kertub
7125	856	EUPA29	Euodia palawensis	beror
7127	1420	EUODI	Euodia spp.	
7128	858	EUTR13	Euodia trichantha	
7129	515	EXAG	Excoecaria agallocha	las, blinding tree
7141	516	FABE	Fagraea berteroana	chelilai
7142	860	FAKS	Fagraea ksid	ksid
7143	1430	FAGRA	Fagraea spp.	
7151	149	FICA	Ficus carica	uosech (kall)
7155	150	FIEL	Ficus elastica	komunokí, rubber plant
7160	352	FIMI2	Ficus microcarpa	lulk, chinese banyan
7165	519	FIPR2	Ficus prolixa	lulk, banyan
7168	861	FISA	Ficus saffordii	lulk, banyan
7171	1440	FICUS	Ficus spp.	
7176	521	FITI2	Ficus tinctoria	oseked
7179	215	FIVI3	Ficus virens	lulu, banyan
7180	863	FICH	Finschia chloroxantha	
7186	216	FLRU2	Flacourtia rukam	
7211	603	PEAM3	Persea americana	bata, avacado
7214	526	GAMA10	Garcinia mangostana	mangostin
7215	864	GAMA8	Garcinia matsudai	tilol
7219	866	GARU3	Garcinia rumiyo	tilol
7221	1450	GARCI	Garcinia spp.	
7241	532	GICE2	Gironniera celtidifolia	
7248	702	GLMA9	Glochidion marianum	
7249	706	GLRA4	Glochidion ramiflorum	
7250	1460	GLOCH	Glochidion spp.	

Palau Trees By Tree Species Number				
Number	Old Number	NRCS Code	Scientific Name	Common Name
7251	869	GMEL	Gmelina elliptica	belau
7252	867	GMPA	Gmelina palawensis	blacheos
7253	1470	GMELI	Gmelina spp.	
7254	868	GNGN	Gnetum gnemon	
7260	870	GOCA2	Goniothalamus carolinensis	
7273	358	GRRO	Grevillea robusta	
7307	536	GUSP3	Guettarda speciosa	belau
7313	871	GUPA	Gulubia palauensis	bochela uchererak, uch
7359	544	HELI9	Heritiera littoralis	ebibech, chebibecb
7362	1500	HERIT2	Heritiera spp.	
7366	156	HESO	Hernandia sonora	doko
7367	1510	HERNA	Hernandia spp.	
7377	157	HEEL9	Heterospathe elata	demailei, ebouch
7381	361	HEBR8	Hevea brasiliensis	
7412	548	HITI	Hibiscus tiliaceus	cheramall
7427	872	HOAM2	Horsfieldia amklaal	chemeklachel, eumail
7428	873	HONO2	Horsfieldia novoguineensis	ersachel
7429	970	HONU2	Horsfieldia nunu	
7430	874	HOPA10	Horsfieldia palauensis	chersachel
7431	1520	HORSF2	Horsfieldia spp.	
7475	550	INFA3	Inocarpus fagifer	keam
7477	551	INBI	Intsia bijuga	dort
7497	875	KAPA4	Kayea pacifica	ketoguit
7506	703	KLHO	Kleinhovia hospita	madudiu
7565	556	LELE10	Leucaena leucocephala	telengtund
7566	1530	LEUCA	Leucaena spp.	
7583	558	LICH4	Litchi chinensis	litchi
7602	562	LULI8	Lumnitzera littorea	ngemoel, mekekad
7614	161	MAIN8	Macadamia integrifolia	
7616	1550	MACAD	Macadamia spp.	
7618	876	MACA25	Macaranga carolinensis	bedel
7623	1560	MACAR	Macaranga spp.	
7638	877	MAPA6	Mallotus palauensis	
7641	1570	MALLO	Mallotus spp.	
7642	878	MATI4	Mallotus tiliifolius	
7654	163	MAOD2	Mammea odorata	ongolbeosachel, odebisech
7655	1580	MAMME	Mammea spp.	
7659	1590	MANGI	Mangifera spp.	

Palau Trees By Tree Species Number				
Number	Old Number	NRCS Code	Scientific Name	Common Name
7671	1600	MANIL	Manilkara spp.	
7672	882	MAUD	Manilkara udoido	udeuid
7674	166	MAZA	Manilkara zapota	sapodilla
7679	935	MACO	Maranthes corymbosa	bkau, apgau
7680	883	MAFR11	Marattia fraxinea	dermarm
7704	884	MECA21	Medusanthera carolinensis	
7706	1610	MEDUS2	Medusanthera spp.	
7712	7734	MECA9	Melastoma candidum	
7713	7735	MESA3	Melastoma sanguineum	
7777	886	MESE11	Meryta senfftiana	omechidel
7778	1620	MERYT	Meryta spp.	
7798	169	MEAM4	Metroxylon amicarum	ivory-nut palm
7799	887	MESA7	Metroxylon sagu	sago palm
7800	1630	METRO2	Metroxylon spp.	
7831	585	MIPI9	Millettia pinnata	
7849	586	MOCI3	Morinda citrifolia	ngel, kesengelngel
7850	888	MOLA12	Morinda latibractea	ngel
7851	889	MOPE2	Morinda pedunculata	
7852	1640	MORIN	Morinda spp.	
7855	171	MOOL	Moringa oleifera	malungkai, drumstick tree
7867	173	MUCA4	Muntingia calabura	budo
7880	896	MUFR3	Mussaenda frondosa	
7882	1660	MUSSA	Mussaenda spp.	
7902	590	MYHY2	Myristica hypargyraea	
7903	897	MYIN3	Myristica insularis	adepurot
7904	1670	MYRIS	Myristica spp.	
7942	591	NEOP	Neisosperma oppositifolia	uaoch
7948	592	NEFO2	Neonauclea forsteri	
7952	593	NELA7	Nephelium lappaceum	rambotang
7962	898	NECE	Neuburgia celebica	kalm, aralm
7974	899	NYFR2	Nypa fruticans	toechel, teuechel
7980	900	OCPY	Ochroma pyramidale	balsa
8010	1680	HOMAL6	Homalanthus spp.	
8019	901	ORCA12	Ormosia calavensis	amansis, edebsungelked, necklace bead tree
8022	716	OSOL	Osmoxylon oliveri	kesiamel
8023	717	OSPA	Osmoxylon pachyphyllum	kesiamel
8024	1690	OSMOX	Osmoxylon spp.	
8036	902	PAAQ2	Pachira aquatica	miich era ngebard, guiana chestnut

Palau Trees By Tree Species Number				
Number	Old Number	NRCS Code	Scientific Name	Common Name
8054	903	PAAI	Pandanus aimiriikensis	chertochet
8056	906	PACO3	Pandanus compressus	ongor
8059	909	PADI29	Pandanus divergens	ongor
8060	175	PADU3	Pandanus dubius	beku, ongor
8061	910	PADU4	Pandanus duriocarpus	ongor
8067	915	PAKA2	Pandanus kanehirae	buuk
8068	916	PAKO2	Pandanus korrensis	siu
8072	920	PAMA32	Pandanus macrojeanneretia	ongor, ertochet
8074	8074	PAKA	Palaquium karrak	
8076	924	PAPA38	Pandanus palawensis	ongor, ertochet
8078	926	PAPE	Pandanus peliliuensis	ongor
8084	1700	PANDA	Pandanus spp.	
8085	692	PATE2	Pandanus tectorius	ongor
8088	933	PAUT	Pandanus utilis	
8090	934	PAVA4	Pandanus variegatus	berrakelongor
8091	178	PAED4	Pangium edule	riamel
8104	936	PALA5	Parinari laurina	
8105	1710	PARIN	Parinari spp.	
8107	8144	PAKO5	Parkia korom	
8108	937	PAPA2	Parkia parvifoliola	kmekumer
8123	602	PEAC6	Pemphis acidula	ngis
8129	709	PEMO13	Pericopsis mooniana	
8181	938	PIIN5	Pinanga insignis	chebouch, demailei
8206	605	PIAR8	Pipturus argenteus	oliulakerasus
8213	606	PIGR6	Pisonia grandis	mesbesibech, chimoi
8215	1740	PISON	Pisonia spp.	
8217	607	PIUM2	Pisonia umbellifera	udeuidar bekai
8220	385	PIDU	Pithecellobium dulce	kamatsiri
8269	184	PLOBO	Plumeria obtusa	elilai ra ngebard
8271	185	PLRU2	Plumeria rubra	elilai ra ngebard, chelilairangebard
8272	1770	PLUME	Plumeria spp.	
8283	701	POGR28	Polyscias grandifolia	bungaruau
8286	939	PONO10	Polyscias nodosa	bngei
8289	1780	POLYS4	Polyscias spp.	
8295	186	POPI4	Pongamia pinnata	kisaks
8298	942	POCA6	Pouteria calcarea	elangel, chelangel
8303	188	POOB8	Pouteria obovata	elangel, chelangel
8306	1800	POUTE	Pouteria spp.	

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8307	190	PROB	Premna obtusifolia	
8308	943	PRPU5	Premna pubescens	
8310	1810	PREMN	Premna spp.	
8356	624	PSGU	Psidium guajava	kuabang, guava
8398	971	PSRH2	Psychotria rhombocarpa	
8407	194	PTIN2	Pterocarpus indicus	las
8412	973	PTLE3	Ptychococcus ledermannianus	
8416	945	PTPA	Ptychosperma palauense	chesdbuuch
8418	1830	PTYCH4	Ptychosperma spp.	
8432	946	RAIN8	Rauvolfia insularis	omechidel
8436	947	RAMA7	Ravenala madagascariensis	travelers palm
8458	195	RHAP2	Rhizophora apiculata	bngaol
8460	720	RHLA12	Rhizophora lamarckii	
8462	196	RHMU	Rhizophora mucronata	tebechel
8463	1850	RHIZO	Rhizophora spp.	
8466	8505	RHTO10	Rhodomyrtus tomentosa	rose myrtle
8469	634	RHTA	Rhus taitensis	eues, choes
8474	948	RICA16	Rinorea carolinensis	
8491	949	ROOL	Roystonea oleracea	royal palm
8503	950	SAIN13	Samadera indica	etkeam, cheskeam
8505	8505	SASA10	Albizia saman	
8505	636	SASA10	Samanea saman	
8534	951	SAIN2	Sapium indicum	maskerekur
8577	952	SCHY5	Scyphiphora hydrophyllacea	kuat
8586	953	SEVE4	Semecarpus venenosa	tonget
8601	954	SEKA2	Serianthes kanehirae	ukall
8605	647	SEGR5	Sesbania grandiflora	katurai
8639	200	SOAL10	Sonneratia alba	churur, urur
8643	649	SOTO3	Sophora tomentosa	dudurs, silver bush
8644	650	SPCA2	Spathodea campanulata	african tulip tree
8649	652	SPDU3	Spondias dulcis	meseiedel, mesechoes
8650	955	SPMO	Spondias mombin	meseheol
8653	1860	SPOND	Spondias spp.	
8655	957	STAM10	Stemonurus ammui	ngmui
8656	956	SPPI4	Spondias pinnata	titímel
8667	958	STPA20	Sterculia palauensis	
8678	1870	SWIET	Swietenia spp.	
8679	655	SWMA	Swietenia macrophylla	mahogany, honduras mahogany

Palau Trees By Tree Species Number				
Number	Old Number	NRCS Code	Scientific Name	Common Name
8687	722	SYRA6	Symplocos racemosa	chebtui, ebtui
8719	960	TAAU3	Tabernaemontana aurantiaca	
8743	961	TEST	Tecoma stans	
8744	962	TEGR	Tectona grandis	tsik, teak
8748	1880	TERMI	Terminalia spp.	
8750	670	TECA	Terminalia catappa	beach almond, miich, otochel
8751	964	TECR3	Terminalia crassipes	esemiich, chesemiich
8752	965	TEED	Terminalia edulis	esemiich, chesemiich
8755	966	TEKA4	Terminalia kaernbachii	tropical almond
8759	674	TESA2	Terminalia samoensis	esemiich
8784	675	THCA	Theobroma cacao	suklatei, cocoa
8787	676	THPO3	Thespesia populnea	badrerirt
8806	723	TICO7	Timonius corymbosus	
8807	724	TIMO4	Timonius mollis	
8808	1890	TIMON	Timonius spp.	
8809	726	TISU3	Timonius subauritus	
8810	727	TITI	Timonius timon	
8824	678	TOAR2	Tournefortia argentea	rirs, tree heliotrope
8827	679	TRCA33	Trema cannabina	chelodechoel
8831	204	TROR	Trema orientalis	chelodechoel
8832	1900	TREMA	Trema spp.	
8838	968	TRLE8	Trichospermum ledermannii	elsau, oleiulakersus
8846	205	TROB7	Tristiropsis obtusangula	
8872	8911	VICO17	Vitex cofassus	bars, beokel
8875	1910	VITEX	Vitex spp.	
8901	207	XIAM	Ximenia americana	kerekurlechol
8903	685	XYGR	Xylocarpus granatum	meduulokebong
8904	686	XYMO2	Xylocarpus moluccensis	puzzlenut
8905	1920	XYLOC2	Xylocarpus spp.	

Palau Trees By Old Tree Species Number				
Old Number	Number	NRCS Code	Scientific Name	Common Name
49	6003	ACAU	Acacia auriculiformis	auri
65	896	SYCU	Syzygium cumini	
101	6048	AICO2	Aidia cochinchinensis	
102	6059	ALLE	Albizia lebbeck	
105	6129	ANRE	Annona reticulata	ngel ra ngebard
106	6137	ANBU3	Antidesma bunius	jiam, siam
108	6157	ARHE12	Araucaria heterophylla	norfolk island pine
109	6169	ARPI6	Arenga pinnata	
110	6175	ARMA28	Artocarpus mariannensis	chebiei, mediuu liou
111	6156	AREX4	Araucaria excelsa	
112	6221	BARA5	Barringtonia racemosa	koranges
113	6226	BAMO2	Bauhinia monandra	Orchid tree
117	6437	CALI8	Casuarina litorea	gagu,australian pine
119	6449	CEPE2	Ceiba pentandra	kalngebard
122	6578	CIGR	Citrus grandis	siabong
124	6575	CILI5	Citrus limon	lemon, malchianged, debechel
129	6684	COAR2	Coffea arabica	kohi, coffee
134	6852	CYCI3	Cycas circinalis	kokeal, remiang
134	6852	CYCI3	Cycas micronesica	kokeal, remiang
135	6858	CYRA8	Cynometra ramiflora	kalengui, ketenguit
142	6980	ELJO	Elaeocarpus joga	dekemerír
144	7078	EUJA4	Eugenia javanica	rebotel
145	7082	EUMA5	Eugenia malaccensis	kidel
149	7151	FICA	Ficus carica	uosech (kall)
150	7155	FIEL	Ficus elastica	komunokí, rubber plant
156	7366	HESO	Hernandia sonora	doko
157	7377	HEEL9	Heterospathe elata	demailei, ebouch
161	7614	MAIN8	Macadamia integrifolia	
163	7654	MAOD2	Mammea odorata	ongolbeosachel, odebisech
166	7674	MAZA	Manilkara zapota	sapodilla
169	7798	MEAM4	Metroxylon amicarum	ivory-nut palm
171	7855	MOOL	Moringa oleifera	malungkai, drumstick tree
173	7867	MUCA4	Muntingia calabura	budo
175	8060	PADU3	Pandanus dubius	beku, ongor
178	8091	PAED4	Pangium edule	riamel
184	8269	PLOBO	Plumeria obtusa	elilai ra ngebard
185	8271	PLRU2	Plumeria rubra	elilai ra ngebard, chelilairangebard
186	8295	POPI4	Pongamia pinnata	kisaks

Palau Trees By Old Tree Species Number				
Old Number	Number	NRCS Code	Scientific Name	Common Name
188	8303	POOB8	Pouteria obovata	elangel, chelangel
190	8307	PROB	Premna obtusifolia	
194	8407	PTIN2	Pterocarpus indicus	las
195	8458	RHAP2	Rhizophora apiculata	bngaol
196	8462	RHMU	Rhizophora mucronata	tebechel
200	8639	SOAL10	Sonneratia alba	churur, urur
204	8831	TROR	Trema orientalis	chelodechoel
205	8846	TROB7	Tristiropsis obtusangula	
207	8901	XIAM	Ximenia americana	kerekurlechol
213	511	EUGL	Eucalyptus globulus	
215	7179	FIVI3	Ficus virens	lulu, banyan
216	7186	FLRU2	Flacourtia rukam	
278	6004	ACCO	Acacia confusa	ianangi
293	6171	ARAL7	Artocarpus altilis	arandu, meduu, breadfruit
294	6173	ARHE2	Artocarpus heterophyllus	baramits
295	6176	ARNO	Artocarpus nobilis	
339	7034	EUDE2	Eucalyptus deglupta	eucalyptus
340	7047	EUPI	Eucalyptus pilularis	
341	514	EURO2	Eucalyptus robusta	swampy mahogany
342	7053	EUSA	Eucalyptus saligna	
343	7054	EUSI2	Eucalyptus sideroxylon	
352	7160	FIMI2	Ficus microcarpa	lulk, chinese banyan
358	7273	GRRO	Grevillea robusta	
361	7381	HEBR8	Hevea brasiliensis	
385	8220	PIDU	Pithecellobium dulce	kamatsiri
400	6028	ADPA	Adenanthera pavonina	telentundalel
408	6085	ALTI2	Allophylus timorensis	ebeludes, chebeludes
412	6128	ANMU2	Annona muricata	sausab
413	6131	ANSQ	Annona squamosa	ngel ra ngebard
417	6167	ARCA41	Areca catechu	buuch, betel nut
427	6197	AVBI	Averrhoa bilimbi	imukurs, oterebekii
428	6198	AVCA	Averrhoa carambola	kemim, ourderteboteb
430	6220	BAAS3	Barringtonia asiatica	bdull
435	6268	BRSE11	Bruguiera gymnorhiza	kodenges, denges
435	6268	BRSE11	Bruguiera sexangula	kodenges, denges
440	6341	CAIN4	Calophyllum inophyllum	btaches
441	6370	CAOD	Cananga odorata	irang, chirang
448	6395	CAPA23	Carica papaya	bobai, chebingel

Palau Trees By Old Tree Species Number				
Old Number	Number	NRCS Code	Scientific Name	Common Name
450	6415	CAFI3	Cassia fistula	shower tree
452	6434	CAEQ	Casuarina equisetifolia	ngas, ironwood
454	6461	CEMA20	Cerbera manghas	emeridech
457	6541	CHCA10	Chrysophyllum cainito	kaimito, kemim, star apple
458	6564	CIVE2	Cinnamomum verum	ochod ra ngebard, cinnamontree
461	6572	CIAU	Citrus aurantifolia	malchianged
463	6584	CIRE3	Citrus reticulata	kerekur
466	908	CONU	Cocos nucifera	lius, coconut
468	6703	COBA17	Commersonia bartramia	eremallueang, chermallucheang
472	6742	COSU2	Cordia subcordata	baderirt, badrirs
481	6847	CYATH	Cyathea spp.	
485	6883	DERE	Delonix regia	nangyo, nangiosikura
487	6902	DIDI9	Diospyros discolor	matib, velvet apple
508	7008	ERFU2	Erythrina fusca	roro
510	7016	ERVAO	Erythrina variegata	roro
512	7091	EURE7	Eugenia reinwardtiana	kesiil
515	7129	EXAG	Excoecaria agallocha	las, blinding tree
516	7141	FABE	Fagraea berteroana	chelilai
519	7165	FIPR2	Ficus prolixa	lulk, banyan
521	7176	FITI2	Ficus tinctoria	oseked
526	7214	GAMA10	Garcinia mangostana	mangostin
532	7241	GICE2	Gironniera celtidifolia	
536	7307	GUSP3	Guettarda speciosa	belau
544	7359	HELI9	Heritiera littoralis	ebibech, chebibecb
548	7412	HITI	Hibiscus tiliaceus	cheramall
550	7475	INFA3	Inocarpus fagifer	keam
551	7477	INBI	Intsia bijuga	dort
556	7565	LELE10	Leucaena leucocephala	telengtund
558	7583	LICH4	Litchi chinensis	litchi
562	7602	LULI8	Lumnitzera littorea	ngemoel, mekekad
569	885	MAIN3	Mangifera indica	ledel, mango
585	7831	MIPI9	Millettia pinnata	
586	7849	MOCI3	Morinda citrifolia	ngel, kesengelngel
590	7902	MYHY2	Myristica hypargyraea	
591	7942	NEOP	Neisosperma oppositifolia	uaoch
592	7948	NEFO2	Neonauclea forsteri	
593	7952	NELA7	Nephelium lappaceum	rambotang
602	8123	PEAC6	Pemphis acidula	ngis

Palau Trees By Old Tree Species Number				
Old Number	Number	NRCS Code	Scientific Name	Common Name
603	7211	PEAM3	Persea americana	bata, avacado
605	8206	PIAR8	Pipturus argenteus	oliulakerasus
606	8213	PIGR6	Pisonia grandis	mesbesibech, chimoi
607	8217	PIUM2	Pisonia umbellifera	udeuidar bekai
624	8356	PSGU	Psidium guajava	kuabang, guava
634	8469	RHTA	Rhus taitensis	eues, choes
636	8505	SASA10	Samanea saman	
647	8605	SEGR5	Sesbania grandiflora	katurai
649	8643	SOTO3	Sophora tomentosa	dudurs, silver bush
650	8644	SPCA2	Spathodea campanulata	african tulip tree
652	8649	SPDU3	Spondias dulcis	meseiedel, mesechoes
655	8679	SWMA	Swietenia macrophylla	mahogany, honduras mahogany
670	8750	TECA	Terminalia catappa	beach almond, miich, otochel
674	8759	TESA2	Terminalia samoensis	esemiich
675	8784	THCA	Theobroma cacao	suklatei, cocoa
676	8787	THPO3	Thespesia populnea	badrerirt
678	8824	TOAR2	Tournefortia argentea	rirs, tree heliotrope
679	8827	TRCA33	Trema cannabina	chelodechoel
685	8903	XYGR	Xylocarpus granatum	meduulokebong
686	8904	XYMO2	Xylocarpus moluccensis	puzzlenut
691	6840	CYLU5	Cyathea lunulata	eluu, tree fern, cheluu
692	8085	PATE2	Pandanus tectorius	ongor
701	8283	POGR28	Polyscias grandifolia	bungaruau
702	7248	GLMA9	Glochidion marianum	
703	7506	KLHO	Kleinhovia hospita	madudiu
706	7249	GLRA4	Glochidion ramiflorum	
707	6200	AVAL	Avicennia alba	biut
707	6200	AVAL	Avicennia marina subsp. Marina	biut
708	6472	CETA2	Ceriops tagal	biut
709	8129	PEMO13	Pericopsis mooniana	
712	6927	DOVI	Dodonaea viscosa	
713	6933	DRMU2	Dracaena multiflora	
715	715	MAPA28	Maytenus palauica	
716	8022	OSOL	Osmoxylon oliveri	kesiamel
717	8023	OSPA	Osmoxylon pachyphyllum	kesiamel
718	718	OSTR	Osmoxylon truncatum	kesiamel
720	8460	RHLA12	Rhizophora lamarckii	
722	8687	SYRA6	Symplocos racemosa	chebtui, ebtui

Palau Trees By Old Tree Species Number				
Old Number	Number	NRCS Code	Scientific Name	Common Name
723	8806	TICO7	Timonius corymbosus	
724	8807	TIMO4	Timonius mollis	
726	8809	TISU3	Timonius subauritus	
727	8810	TITI	Timonius timon	
800	6043	AGPA19	Aglaia palauensis	mesecheues
802	6058	ALFA5	Albizia falcataria	ukall ra ngebard
803	6061	ALRE	Albizia retusa	ukall ra ngebard
804	6084	ALTE13	Allophylus ternatus	chebeludes
805	6088	ALCA21	Alphitonia carolinensis	chelebiob, elebiong
806	6118	ANEV	Angiopteris evecta	dermarm
807	6186	ASPA37	Astronidium palauense	meskui
808	6213	BAPA8	Badusa palauensis	ralm
809	6225	BABI6	Bauhinia binata	
810	6277	BUEN	Buchanania engleriana	omail
811	6279	BUPA16	Buchanania palawensis	omail, deuachel
812	6343	CAPE15	Calophyllum pelewense	chesemolech
813	6344	CASO12	Calophyllum soulattri	olebtaches, chesemolech
814	6366	CABR18	Campnosperma brevipetiolatum	kelela charm, kiu
815	6373	CAHI14	Canarium hirsutum	mesecheues
817	6399	CAMI36	Caryota mitis	fish tail palm
818	6405	CACA28	Casearia cauliflora	keuert
819	6417	CAGR11	Cassia grandis	pink shower
820	6420	CASI4	Cassia siamea	kassod tree
821	6452	CEPA6	Celtis paniculata	
822	6460	CEFL2	Cerbera floribunda	emeridech
823	6557	CICA2	Cinnamomum carolinense	ochod
824	6561	CIPE6	Cinnamomum pedatinervium	ochod
826	6583	CIMI3	Citrus mitis	calamondin, kingkang
828	6588	CLFA6	Claoxylon fallax	
829	6589	CLLO5	Claoxylon longiracemosum	
830	6593	CLCA18	Cleistanthus carolinianus	
831	6594	CLIN8	Cleistanthus insularis	
832	6691	COSC13	Colona scabra	uab, chuchab
833	6702	COTE15	Combretum tetralophum	ochaol
834	6736	COMI6	Cordia micronesica	
835	865	COSE2	Cordia sebestena	kalau, kelau
836	6842	CYNI7	Cyathea nigricans	

Palau Trees By Old Tree Species Number				
Old Number	Number	NRCS Code	Scientific Name	Common Name
838	6853	CYRE11	Cycas revoluta	remiang
839	6905	DIFE5	Diospyros ferrea	
840	6928	DOSP3	Dolichandrone spathacea	rríu
842	6941	DRNI3	Drypetes nitida	kevert
843	6973	ELGU	Elaeis guineensis	oil nut palm
844	6976	ELCA20	Elaeocarpus carolinensis	
848	7059	EUAQ	Eugenia aquea	edebsachel, chedebsachel
849	7065	EUCA16	Eugenia caryophyllus	cloves
850	7086	EUNI2	Eugenia nitida	
851	7087	EUPA3	Eugenia palauensis	orenged
852	7101	EUSU9	Eugenia suzukii	rebotel
855	7124	EUNI8	Euodia nitida	kertub
856	7125	EUPA29	Euodia palawensis	beror
858	7128	EUTR13	Euodia trichantha	
860	7142	FAKS	Fagraea ksid	ksid
861	7168	FISA	Ficus saffordii	lulk, banyan
863	7180	FICH	Finschia chloroxantha	
864	7215	GAMA8	Garcinia matsudai	tilol
866	7219	GARU3	Garcinia rumiyo	tilol
867	7252	GMPA	Gmelina palawensis	blacheos
868	7254	GNGN	Gnetum gnemon	
869	7251	GMEL	Gmelina elliptica	belau
870	7260	GOCA2	Goniothalamus carolinensis	
871	7313	GUPA	Gulubia palauensis	bochela uchererak, uch
872	7427	HOAM2	Horsfieldia amklaal	chemeklachel, eumail
873	7428	HONO2	Horsfieldia novoguineensis	ersachel
874	7430	HOPA10	Horsfieldia palauensis	chersachel
875	7497	KAPA4	Kayea pacifica	ketoguit
876	7618	MACA25	Macaranga carolinensis	bedel
877	7638	MAPA6	Mallotus palauensis	
878	7642	MATI4	Mallotus tiliifolius	
882	7672	MAUD	Manilkara udoido	udeuid
883	7680	MAFR11	Marattia fraxinea	dermarm
884	7704	MECA21	Medusanthera carolinensis	
885	992	MEQU	Melaleuca quinquenervia	paperbark guava
886	7777	MESE11	Meryta senfftiana	omechidel
887	7799	MESA7	Metroxylon sagu	sago palm
888	7850	MOLA12	Morinda latibractea	ngel

Palau Trees By Old Tree Species Number				
Old Number	Number	NRCS Code	Scientific Name	Common Name
889	7851	MOPE2	Morinda pedunculata	
896	7880	MUFR3	Mussaenda frondosa	
897	7903	MYIN3	Myristica insularis	adepurot
898	7962	NECE	Neuburgia celebica	kalm, aralm
899	7974	NYFR2	Nypa fruticans	toechel, teuechel
900	7980	OCPY	Ochroma pyramidale	balsa
901	8019	ORCA12	Ormosia calavensis	amansis, edebsungelked, necklace bead tree
902	8036	PAAQ2	Pachira aquatica	miich era ngebard, guiana chestnut
903	8054	PAAI	Pandanus aimiriikensis	chertochet
906	8056	PACO3	Pandanus compressus	ongor
909	8059	PADI29	Pandanus divergens	ongor
910	8061	PADU4	Pandanus duriocarpus	ongor
915	8067	PAKA2	Pandanus kanehirae	buuk
916	8068	PAKO2	Pandanus korrensis	siu
920	8072	PAMA32	Pandanus macrojeanneretia	ongor, ertochet
924	8076	PAPA38	Pandanus palawensis	ongor, ertochet
926	8078	PAPE	Pandanus peliliuensis	ongor
933	8088	PAUT	Pandanus utilis	
934	8090	PAVA4	Pandanus variegatus	berrakelongor
935	7679	MACO	Maranthes corymbosa	bkau, apgau
936	8104	PALA5	Parinari laurina	
937	8108	PAPA2	Parkia parvifoliola	kmekumer
938	8181	PIIN5	Pinanga insignis	chebouch, demailei
939	8286	PONO10	Polyscias nodosa	bngei
942	8298	POCA6	Pouteria calcarea	elangel, chelangel
943	8308	PRPU5	Premna pubescens	
945	8416	PTPA	Ptychosperma palauense	chesdbuuch
946	8432	RAIN8	Rauvolfia insularis	omechidel
947	8436	RAMA7	Ravenala madagascariensis	travelers palm
948	8474	RICA16	Rinorea carolinensis	
949	8491	ROOL	Roystonea oleracea	royal palm
950	8503	SAIN13	Samadera indica	etkeam, cheskeam
951	8534	SAIN2	Sapium indicum	maskerekur
952	8577	SCHY5	Scyphiphora hydrophyllacea	kuat
953	8586	SEVE4	Semecarpus venenosa	tonget
954	8601	SEKA2	Serianthes kanehirae	ukall
955	8650	SPMO	Spondias mombin	meseheol
956	8656	SPPI4	Spondias pinnata	titímel

Palau Trees By Old Tree Species Number				
Old Number	Number	NRCS Code	Scientific Name	Common Name
957	8655	STAM10	Stemonurus ammui	ngmui
958	8667	STPA20	Sterculia palauensis	
959	940	SWMA2	Swietenia mahagoni	mahogany
960	8719	TAAU3	Tabernaemontana aurantiaca	
961	8743	TEST	Tecoma stans	
962	8744	TEGR	Tectona grandis	tsik, teak
964	8751	TECR3	Terminalia crassipes	esemiich, chesemiich
965	8752	TEED	Terminalia edulis	esemiich, chesemiich
966	8755	TEKA4	Terminalia kaernbachii	tropical almond
968	8838	TRLE8	Trichospermum ledermannii	elsau, oleiulakersus
970	7429	HONU2	Horsfieldia nunu	
971	8398	PSRH2	Psychotria rhombocarpa	
972	6138	ANKU3	Antidesma kusaiense	
973	8412	PTLE3	Ptychococcus ledermannianus	
1010	6063	ALBIZ	Albizia spp.	
1020	6047	AGLAI	Aglaia spp.	
1040	6083	ALLOP	Allophylus spp.	
1050	6090	ALPHI	Alphitonia spp.	
1060	6130	ANNON	Annona spp.	
1070	6145	ANTID	Antidesma spp.	
1080	6158	ARAUC2	Araucaria spp.	
1090	6178	ARTOC	Artocarpus spp.	meduu
1100	6189	ASTRO4	Astronidium spp.	
1110	6199	AVERR	Averrhoa spp.	
1120	6205	AVICE	Avicennia spp.	
1130	6223	BARRI	Barringtonia spp.	
1140	6230	BAUHI	Bauhinia spp.	
1150	6280	BUCHA	Buchanania spp.	
1160	6345	CALOP	Calophyllum spp.	
1170	6377	CANAR2	Canarium spp.	
1180	6400	CARYO	Caryota spp.	
1190	6408	CASEA	Casearia spp.	
1200	6422	CASSI	Cassia spp.	
1210	855	CASUA	Casuarina spp.	
1220	460	CELTI	Celtis spp.	
1240	6563	CINNA2	Cinnamomum spp.	
1250	860	CITRU2	Citrus spp.	bekersiu, cheritel
1260	6592	CLAOX	Claoxylon spp.	

Palau Trees By Old Tree Species Number				
Old Number	Number	NRCS Code	Scientific Name	Common Name
1270	6595	CLEIS5	Cleistanthus spp.	
1280	6687	COFFE	Coffea spp.	
1300	6741	CORDI	Cordia spp.	
1310	6783	CRYPT2	Cryptocarya spp.	
1320	6847	CYATH	Cyathea spp.	
1330	6854	CYCAS	Cycas spp.	
1350	520	DIOSP	Diospyros spp.	
1360	6942	DRYPE	Drypetes spp.	
1370	6971	DYSOX	Dysoxylum spp.	
1380	6983	ELAEO	Elaeocarpus spp.	
1390	7013	ERYTH	Erythrina spp.	
1410	7096	EUGEN	Eugenia spp.	
1420	7127	EUODI	Euodia spp.	
1430	7143	FAGRA	Fagraea spp.	
1440	7171	FICUS	Ficus spp.	
1450	7221	GARCI	Garcinia spp.	
1460	7250	GLOCH	Glochidion spp.	
1470	7253	GMELI	Gmelina spp.	
1500	7362	HERIT2	Heritiera spp.	
1510	7367	HERNA	Hernandia spp.	
1520	7431	HORSF2	Horsfieldia spp.	
1530	7566	LEUCA	Leucaena spp.	
1550	7616	MACAD	Macadamia spp.	
1560	7623	MACAR	Macaranga spp.	
1570	7641	MALLO	Mallotus spp.	
1580	7655	MAMME	Mammea spp.	
1590	7659	MANGI	Mangifera spp.	
1600	7671	MANIL	Manilkara spp.	
1610	7706	MEDUS2	Medusanthera spp.	
1620	7778	MERYT	Meryta spp.	
1630	7800	METRO2	Metroxylon spp.	
1640	7852	MORIN	Morinda spp.	
1660	7882	MUSSA	Mussaenda spp.	
1670	7904	MYRIS	Myristica spp.	
1680	8010	HOMAL6	Homalanthus spp.	
1690	8024	OSMOX	Osmoxylon spp.	
1700	8084	PANDA	Pandanus spp.	
1710	8105	PARIN	Parinari spp.	

Palau Trees By Old Tree Species Number				
Old Number	Number	NRCS Code	Scientific Name	Common Name
1740	8215	PISON	Pisonia spp.	
1770	8272	PLUME	Plumeria spp.	
1780	8289	POLYS4	Polyscias spp.	
1800	8306	POUTE	Pouteria spp.	
1810	8310	PREMN	Premna spp.	
1830	8418	PTYCH4	Ptychosperma spp.	
1850	8463	RHIZO	Rhizophora spp.	
1860	8653	SPOND	Spondias spp.	
1870	8678	SWIET	Swietenia spp.	
1880	8748	TERMI	Terminalia spp.	
1890	8808	TIMON	Timonius spp.	
1900	8832	TREMA	Trema spp.	
1910	8875	VITEX	Vitex spp.	
1920	8905	XYLOC2	Xylocarpus spp.	
6016	300	ACACI	Acacia spp.	
6084	6084	ALTE13	Allophylus triphyllus	chebeludes
6139	6142	ANPO8	Antidesma ponapense	
6204	6203	AVMA3	Avicennia marina	
6463	6463	CERBE	Cerbera spp	
6627	6622	CLPE2	Clermontia peleana	
6632	6627	CLSI3	Clermontia singuliflora	
6786	6778	CROR5	Cryptocarya oreophila	
7055	510	EUCAL	Eucalyptus spp.	
7734	7712	MECA9	Melastoma candidum	
7735	7713	MESA3	Melastoma sanguineum	
8074	8074	PAKA	Palaquium karrak	
8144	8107	PAKO5	Parkia korom	
8505	8466	RHTO10	Rhodomyrtus tomentosa	rose myrtle
8505	8505	SASA10	Albizia saman	
8911	8872	VICO17	Vitex cofassus	bars, beokel

Palau Trees By Scientific Name				
Scientific Name	Number	Old Number	NRCS Code	Common Name
Acacia auriculiformis	6003	49	ACAU	auri
Acacia confusa	6004	278	ACCO	ianangi
Acacia spp.	300	6016	ACACI	
Adenanthera pavonina	6028	400	ADPA	telentundalel
Aglaia palauensis	6043	800	AGPA19	mesecheues
Aglaia spp.	6047	1020	AGLAI	
Aidia cochinchinensis	6048	101	AICO2	
Albizia falcataria	6058	802	ALFA5	ukall ra ngebard
Albizia lebbeck	6059	102	ALLE	
Albizia retusa	6061	803	ALRE	ukall ra ngebard
Albizia saman	8505	8505	SASA10	
Albizia spp.	6063	1010	ALBIZ	
Allophylus spp.	6083	1040	ALLOP	
Allophylus ternatus	6084	804	ALTE13	chebeludes
Allophylus timorensis	6085	408	ALTI2	ebeludes, chebeludes
Allophylus triphyllus	6084	6084	ALTE13	chebeludes
Alphitonia carolinensis	6088	805	ALCA21	chelebiob, elebiong
Alphitonia spp.	6090	1050	ALPHI	
Angiopteris evecta	6118	806	ANEV	dermarm
Annona muricata	6128	412	ANMU2	sausab
Annona reticulata	6129	105	ANRE	ngel ra ngebard
Annona spp.	6130	1060	ANNON	
Annona squamosa	6131	413	ANSQ	ngel ra ngebard
Antidesma bunius	6137	106	ANBU3	jiam, siam
Antidesma kusaiense	6138	972	ANKU3	
Antidesma ponapense	6142	6139	ANPO8	
Antidesma spp.	6145	1070	ANTID	
Araucaria excelsa	6156	111	AREX4	
Araucaria heterophylla	6157	108	ARHE12	norfolk island pine
Araucaria spp.	6158	1080	ARAUC2	
Areca catechu	6167	417	ARCA41	buuch, betel nut
Arenga pinnata	6169	109	ARPI6	
Artocarpus altilis	6171	293	ARAL7	arandu, meduu, breadfruit
Artocarpus heterophyllus	6173	294	ARHE2	baramits
Artocarpus mariannensis	6175	110	ARMA28	chebiei, mediuu liou
Artocarpus nobilis	6176	295	ARNO	
Artocarpus spp.	6178	1090	ARTOC	meduu
Astronidium palauense	6186	807	ASPA37	meskui

Palau Trees By Scientific Name

Scientific Name	Number	Old Number	NRCS Code	Common Name
Astronidium spp.	6189	1100	ASTRO4	
Averrhoa bilimbi	6197	427	AVBI	imukurs, oterebekii
Averrhoa carambola	6198	428	AVCA	kemim, ourderteboteb
Averrhoa spp.	6199	1110	AVERR	
Avicennia alba	6200	707	AVAL	biut
Avicennia marina	6203	6204	AVMA3	
Avicennia marina subsp. Marina	6200	707	AVAL	biut
Avicennia spp.	6205	1120	AVICE	
Badusa palauensis	6213	808	BAPA8	ralm
Barringtonia asiatica	6220	430	BAAS3	bdull
Barringtonia racemosa	6221	112	BARA5	koranges
Barringtonia spp.	6223	1130	BARRI	
Bauhinia binata	6225	809	BABI6	
Bauhinia monandra	6226	113	BAMO2	Orchid tree
Bauhinia spp.	6230	1140	BAUHI	
Bruguiera gymnorhiza	6268	435	BRSE11	kodenges, denges
Bruguiera sexangula	6268	435	BRSE11	kodenges, denges
Buchanania engleriana	6277	810	BUEN	omail
Buchanania palawensis	6279	811	BUPA16	omail, deuachel
Buchanania spp.	6280	1150	BUCHA	
Calophyllum inophyllum	6341	440	CAIN4	btaches
Calophyllum pelewense	6343	812	CAPE15	chesemolech
Calophyllum soulattri	6344	813	CASO12	olebtaches, chesemolech
Calophyllum spp.	6345	1160	CALOP	
Campnosperma brevipetiolatum	6366	814	CABR18	kelela charm, kiu
Cananga odorata	6370	441	CAOD	irang, chirang
Canarium hirsutum	6373	815	CAHI14	mesecheues
Canarium spp.	6377	1170	CANAR2	
Carica papaya	6395	448	CAPA23	bobai, chebingel
Caryota mitis	6399	817	CAMI36	fish tail palm
Caryota spp.	6400	1180	CARYO	
Casearia cauliflora	6405	818	CACA28	keuert
Casearia spp.	6408	1190	CASEA	
Cassia fistula	6415	450	CAFI3	shower tree
Cassia grandis	6417	819	CAGR11	pink shower
Cassia siamea	6420	820	CASI4	kassod tree
Cassia spp.	6422	1200	CASSI	

Palau Trees By Scientific Name				
Scientific Name	Number	Old Number	NRCS Code	Common Name
Casuarina equisetifolia	6434	452	CAEQ	ngas, ironwood
Casuarina litorea	6437	117	CALI8	gagu,australian pine
Casuarina spp.	855	1210	CASUA	
Ceiba pentandra	6449	119	CEPE2	kalngebard
Celtis paniculata	6452	821	CEPA6	
Celtis spp.	460	1220	CELTI	
Cerbera floribunda	6460	822	CEFL2	emeridech
Cerbera manghas	6461	454	CEMA20	emeridech
Cerbera spp	6463	6463	CERBE	
Ceriops tagal	6472	708	CETA2	biut
Chrysophyllum cainito	6541	457	CHCA10	kaimito, kemim, star apple
Cinnamomum carolinense	6557	823	CICA2	ochod
Cinnamomum pedatinervium	6561	824	CIPE6	ochod
Cinnamomum spp.	6563	1240	CINNA2	
Cinnamomum verum	6564	458	CIVE2	ochod ra ngebard, cinnamontree
Citrus aurantifolia	6572	461	CIAU	malchianged
Citrus grandis	6578	122	CIGR	siabong
Citrus limon	6575	124	CILI5	lemon, malchianged, debechel
Citrus mitis	6583	826	CIMI3	calamondin, kingkang
Citrus reticulata	6584	463	CIRE3	kerekur
Citrus spp.	860	1250	CITRU2	bekersiu, cheritel
Claoxylon fallax	6588	828	CLFA6	
Claoxylon longiracemosum	6589	829	CLLO5	
Claoxylon spp.	6592	1260	CLAOX	
Cleistanthus carolinianus	6593	830	CLCA18	
Cleistanthus insularis	6594	831	CLIN8	
Cleistanthus spp.	6595	1270	CLEIS5	
Clermontia peleana	6622	6627	CLPE2	
Clermontia singuliflora	6627	6632	CLSI3	
Cocos nucifera	908	466	CONU	lius, coconut
Coffea arabica	6684	129	COAR2	kohi, coffee
Coffea spp.	6687	1280	COFFE	
Colona scabra	6691	832	COSC13	uab, chuchab
Combretum tetralophum	6702	833	COTE15	ochaol
Commersonia bartramia	6703	468	COBA17	eremallueang, chermallucheang
Cordia micronesica	6736	834	COMI6	
Cordia sebestena	865	835	COSE2	kalau, kelau
Cordia spp.	6741	1300	CORDI	

Palau Trees By Scientific Name				
Scientific Name	Number	Old Number	NRCS Code	Common Name
Cordia subcordata	6742	472	COSU2	baderirt, badrirs
Cryptocarya oreophila	6778	6786	CROR5	
Cryptocarya spp.	6783	1310	CRYPT2	
Cyathea lunulata	6840	691	CYLU5	eluu, tree fern, cheluu
Cyathea nigricans	6842	836	CYNI7	
Cyathea spp.	6847	1320	CYATH	
Cyathea spp.	6847	481	CYATH	
Cycas circinalis	6852	134	CYCI3	kokeal, remiang
Cycas micronesica	6852	134	CYCI3	kokeal, remiang
Cycas revoluta	6853	838	CYRE11	remiang
Cycas spp.	6854	1330	CYCAS	
Cynometra ramiflora	6858	135	CYRA8	kalengui, ketenguit
Delonix regia	6883	485	DERE	nangyo, nangiosikura
Diospyros discolor	6902	487	DIDI9	matib, velvet apple
Diospyros ferrea	6905	839	DIFE5	
Diospyros spp.	520	1350	DIOSP	
Dodonaea viscosa	6927	712	DOVI	
Dolichandrone spathacea	6928	840	DOSP3	rríu
Dracaena multiflora	6933	713	DRMU2	
Drypetes nitida	6941	842	DRNI3	kevert
Drypetes spp.	6942	1360	DRYPE	
Dysoxylum spp.	6971	1370	DYSOX	
Elaeis guineensis	6973	843	ELGU	oil nut palm
Elaeocarpus carolinensis	6976	844	ELCA20	
Elaeocarpus joga	6980	142	ELJO	dekemerír
Elaeocarpus spp.	6983	1380	ELAEO	
Erythrina fusca	7008	508	ERFU2	roro
Erythrina spp.	7013	1390	ERYTH	
Erythrina variegata	7016	510	ERVAO	roro
Eucalyptus deglupta	7034	339	EUDE2	eucalyptus
Eucalyptus globulus	511	213	EUGL	
Eucalyptus pilularis	7047	340	EUPI	
Eucalyptus robusta	514	341	EURO2	swampy mahogany
Eucalyptus saligna	7053	342	EUSA	
Eucalyptus sideroxylon	7054	343	EUSI2	
Eucalyptus spp.	510	7055	EUCAL	
Eugenia aquea	7059	848	EUAQ	edebsachel, chedebsachel
Eugenia caryophyllus	7065	849	EUCA16	cloves

Palau Trees By Scientific Name				
Scientific Name	**Number**	**Old Number**	**NRCS Code**	**Common Name**
Eugenia javanica	7078	144	EUJA4	rebotel
Eugenia malaccensis	7082	145	EUMA5	kidel
Eugenia nitida	7086	850	EUNI2	
Eugenia palauensis	7087	851	EUPA3	orenged
Eugenia reinwardtiana	7091	512	EURE7	kesiil
Eugenia spp.	7096	1410	EUGEN	
Eugenia suzukii	7101	852	EUSU9	rebotel
Euodia nitida	7124	855	EUNI8	kertub
Euodia palawensis	7125	856	EUPA29	beror
Euodia spp.	7127	1420	EUODI	
Euodia trichantha	7128	858	EUTR13	
Excoecaria agallocha	7129	515	EXAG	las, blinding tree
Fagraea berteroana	7141	516	FABE	chelilai
Fagraea ksid	7142	860	FAKS	ksid
Fagraea spp.	7143	1430	FAGRA	
Ficus carica	7151	149	FICA	uosech (kall)
Ficus elastica	7155	150	FIEL	komunokí, rubber plant
Ficus microcarpa	7160	352	FIMI2	lulk, chinese banyan
Ficus prolixa	7165	519	FIPR2	lulk, banyan
Ficus saffordii	7168	861	FISA	lulk, banyan
Ficus spp.	7171	1440	FICUS	
Ficus tinctoria	7176	521	FITI2	oseked
Ficus virens	7179	215	FIVI3	lulu, banyan
Finschia chloroxantha	7180	863	FICH	
Flacourtia rukam	7186	216	FLRU2	
Garcinia mangostana	7214	526	GAMA10	mangostin
Garcinia matsudai	7215	864	GAMA8	tilol
Garcinia rumiyo	7219	866	GARU3	tilol
Garcinia spp.	7221	1450	GARCI	
Gironniera celtidifolia	7241	532	GICE2	
Glochidion marianum	7248	702	GLMA9	
Glochidion ramiflorum	7249	706	GLRA4	
Glochidion spp.	7250	1460	GLOCH	
Gmelina elliptica	7251	869	GMEL	belau
Gmelina palawensis	7252	867	GMPA	blacheos
Gmelina spp.	7253	1470	GMELI	
Gnetum gnemon	7254	868	GNGN	
Goniothalamus carolinensis	7260	870	GOCA2	

Palau Trees By Scientific Name				
Scientific Name	**Number**	**Old Number**	**NRCS Code**	**Common Name**
Grevillea robusta	7273	358	GRRO	
Guettarda speciosa	7307	536	GUSP3	belau
Gulubia palauensis	7313	871	GUPA	bochela uchererak, uch
Heritiera littoralis	7359	544	HELI9	ebibech, chebibecb
Heritiera spp.	7362	1500	HERIT2	
Hernandia sonora	7366	156	HESO	doko
Hernandia spp.	7367	1510	HERNA	
Heterospathe elata	7377	157	HEEL9	demailei, ebouch
Hevea brasiliensis	7381	361	HEBR8	
Hibiscus tiliaceus	7412	548	HITI	cheramall
Homalanthus spp.	8010	1680	HOMAL6	
Horsfieldia amklaal	7427	872	HOAM2	chemeklachel, eumail
Horsfieldia novoguineensis	7428	873	HONO2	ersachel
Horsfieldia nunu	7429	970	HONU2	
Horsfieldia palauensis	7430	874	HOPA10	chersachel
Horsfieldia spp.	7431	1520	HORSF2	
Inocarpus fagifer	7475	550	INFA3	keam
Intsia bijuga	7477	551	INBI	dort
Kayea pacifica	7497	875	KAPA4	ketoguit
Kleinhovia hospita	7506	703	KLHO	madudiu
Leucaena leucocephala	7565	556	LELE10	telengtund
Leucaena spp.	7566	1530	LEUCA	
Litchi chinensis	7583	558	LICH4	litchi
Lumnitzera littorea	7602	562	LULI8	ngemoel, mekekad
Macadamia integrifolia	7614	161	MAIN8	
Macadamia spp.	7616	1550	MACAD	
Macaranga carolinensis	7618	876	MACA25	bedel
Macaranga spp.	7623	1560	MACAR	
Mallotus palauensis	7638	877	MAPA6	
Mallotus spp.	7641	1570	MALLO	
Mallotus tiliifolius	7642	878	MATI4	
Mammea odorata	7654	163	MAOD2	ongolbeosachel, odebisech
Mammea spp.	7655	1580	MAMME	
Mangifera indica	885	569	MAIN3	ledel, mango
Mangifera spp.	7659	1590	MANGI	
Manilkara spp.	7671	1600	MANIL	
Manilkara udoido	7672	882	MAUD	udeuid
Manilkara zapota	7674	166	MAZA	sapodilla

Palau Trees By Scientific Name				
Scientific Name	**Number**	**Old Number**	**NRCS Code**	**Common Name**
Maranthes corymbosa	7679	935	MACO	bkau, apgau
Marattia fraxinea	7680	883	MAFR11	dermarm
Maytenus palauica	715	715	MAPA28	
Medusanthera carolinensis	7704	884	MECA21	
Medusanthera spp.	7706	1610	MEDUS2	
Melaleuca quinquenervia	992	885	MEQU	paperbark guava
Melastoma candidum	7712	7734	MECA9	
Melastoma sanguineum	7713	7735	MESA3	
Meryta senfftiana	7777	886	MESE11	omechidel
Meryta spp.	7778	1620	MERYT	
Metroxylon amicarum	7798	169	MEAM4	ivory-nut palm
Metroxylon sagu	7799	887	MESA7	sago palm
Metroxylon spp.	7800	1630	METRO2	
Millettia pinnata	7831	585	MIPI9	
Morinda citrifolia	7849	586	MOCI3	ngel, kesengelngel
Morinda latibractea	7850	888	MOLA12	ngel
Morinda pedunculata	7851	889	MOPE2	
Morinda spp.	7852	1640	MORIN	
Moringa oleifera	7855	171	MOOL	malungkai, drumstick tree
Muntingia calabura	7867	173	MUCA4	budo
Mussaenda frondosa	7880	896	MUFR3	
Mussaenda spp.	7882	1660	MUSSA	
Myristica hypargyraea	7902	590	MYHY2	
Myristica insularis	7903	897	MYIN3	adepurot
Myristica spp.	7904	1670	MYRIS	
Neisosperma oppositifolia	7942	591	NEOP	uaoch
Neonauclea forsteri	7948	592	NEFO2	
Nephelium lappaceum	7952	593	NELA7	rambotang
Neuburgia celebica	7962	898	NECE	kalm, aralm
Nypa fruticans	7974	899	NYFR2	toechel, teuechel
Ochroma pyramidale	7980	900	OCPY	balsa
Ormosia calavensis	8019	901	ORCA12	amansis, edebsungelked, necklace bead tree
Osmoxylon oliveri	8022	716	OSOL	kesiamel
Osmoxylon pachyphyllum	8023	717	OSPA	kesiamel
Osmoxylon spp.	8024	1690	OSMOX	
Osmoxylon truncatum	718	718	OSTR	kesiamel
Pachira aquatica	8036	902	PAAQ2	miich era ngebard, guiana chestnut
Palaquium karrak	8074	8074	PAKA	

Palau Trees By Scientific Name				
Scientific Name	**Number**	**Old Number**	**NRCS Code**	**Common Name**
Pandanus aimiriikensis	8054	903	PAAI	chertochet
Pandanus compressus	8056	906	PACO3	ongor
Pandanus divergens	8059	909	PADI29	ongor
Pandanus dubius	8060	175	PADU3	beku, ongor
Pandanus duriocarpus	8061	910	PADU4	ongor
Pandanus kanehirae	8067	915	PAKA2	buuk
Pandanus korrensis	8068	916	PAKO2	siu
Pandanus macrojeanneretia	8072	920	PAMA32	ongor, ertochet
Pandanus palawensis	8076	924	PAPA38	ongor, ertochet
Pandanus peliliuensis	8078	926	PAPE	ongor
Pandanus spp.	8084	1700	PANDA	
Pandanus tectorius	8085	692	PATE2	ongor
Pandanus utilis	8088	933	PAUT	
Pandanus variegatus	8090	934	PAVA4	berrakelongor
Pangium edule	8091	178	PAED4	riamel
Parinari laurina	8104	936	PALA5	
Parinari spp.	8105	1710	PARIN	
Parkia korom	8107	8144	PAKO5	
Parkia parvifoliola	8108	937	PAPA2	kmekumer
Pemphis acidula	8123	602	PEAC6	ngis
Pericopsis mooniana	8129	709	PEMO13	
Persea americana	7211	603	PEAM3	bata, avacado
Pinanga insignis	8181	938	PIIN5	chebouch, demailei
Pipturus argenteus	8206	605	PIAR8	oliulakerasus
Pisonia grandis	8213	606	PIGR6	mesbesibech, chimoi
Pisonia spp.	8215	1740	PISON	
Pisonia umbellifera	8217	607	PIUM2	udeuidar bekai
Pithecellobium dulce	8220	385	PIDU	kamatsiri
Plumeria obtusa	8269	184	PLOBO	elilai ra ngebard
Plumeria rubra	8271	185	PLRU2	elilai ra ngebard, chelilairangebard
Plumeria spp.	8272	1770	PLUME	
Polyscias grandifolia	8283	701	POGR28	bungaruau
Polyscias nodosa	8286	939	PONO10	bngei
Polyscias spp.	8289	1780	POLYS4	
Pongamia pinnata	8295	186	POPI4	kisaks
Pouteria calcarea	8298	942	POCA6	elangel, chelangel
Pouteria obovata	8303	188	POOB8	elangel, chelangel
Pouteria spp.	8306	1800	POUTE	

Palau Trees By Scientific Name				
Scientific Name	Number	Old Number	NRCS Code	Common Name
Premna obtusifolia	8307	190	PROB	
Premna pubescens	8308	943	PRPU5	
Premna spp.	8310	1810	PREMN	
Psidium guajava	8356	624	PSGU	kuabang, guava
Psychotria rhombocarpa	8398	971	PSRH2	
Pterocarpus indicus	8407	194	PTIN2	las
Ptychococcus ledermannianus	8412	973	PTLE3	
Ptychosperma palauense	8416	945	PTPA	chesdbuuch
Ptychosperma spp.	8418	1830	PTYCH4	
Rauvolfia insularis	8432	946	RAIN8	omechidel
Ravenala madagascariensis	8436	947	RAMA7	travelers palm
Rhizophora apiculata	8458	195	RHAP2	bngaol
Rhizophora lamarckii	8460	720	RHLA12	
Rhizophora mucronata	8462	196	RHMU	tebechel
Rhizophora spp.	8463	1850	RHIZO	
Rhodomyrtus tomentosa	8466	8505	RHTO10	rose myrtle
Rhus taitensis	8469	634	RHTA	eues, choes
Rinorea carolinensis	8474	948	RICA16	
Roystonea oleracea	8491	949	ROOL	royal palm
Samadera indica	8503	950	SAIN13	etkeam, cheskeam
Samanea saman	8505	636	SASA10	
Sapium indicum	8534	951	SAIN2	maskerekur
Scyphiphora hydrophyllacea	8577	952	SCHY5	kuat
Semecarpus venenosa	8586	953	SEVE4	tonget
Serianthes kanehirae	8601	954	SEKA2	ukall
Sesbania grandiflora	8605	647	SEGR5	katurai
Sonneratia alba	8639	200	SOAL10	churur, urur
Sophora tomentosa	8643	649	SOTO3	dudurs, silver bush
Spathodea campanulata	8644	650	SPCA2	african tulip tree
Spondias dulcis	8649	652	SPDU3	meseiedel, mesechoes
Spondias mombin	8650	955	SPMO	meseheol
Spondias pinnata	8656	956	SPPI4	titímel
Spondias spp.	8653	1860	SPOND	
Stemonurus ammui	8655	957	STAM10	ngmui
Sterculia palauensis	8667	958	STPA20	
Swietenia macrophylla	8679	655	SWMA	mahogany, honduras mahogany
Swietenia mahagoni	940	959	SWMA2	mahogany

Palau Trees By Scientific Name				
Scientific Name	**Number**	**Old Number**	**NRCS Code**	**Common Name**
Swietenia spp.	8678	1870	SWIET	
Symplocos racemosa	8687	722	SYRA6	chebtui, ebtui
Syzygium cumini	896	65	SYCU	
Tabernaemontana aurantiaca	8719	960	TAAU3	
Tecoma stans	8743	961	TEST	
Tectona grandis	8744	962	TEGR	tsik, teak
Terminalia catappa	8750	670	TECA	beach almond, miich, otochel
Terminalia crassipes	8751	964	TECR3	esemiich, chesemiich
Terminalia edulis	8752	965	TEED	esemiich, chesemiich
Terminalia kaernbachii	8755	966	TEKA4	tropical almond
Terminalia samoensis	8759	674	TESA2	esemiich
Terminalia spp.	8748	1880	TERMI	
Theobroma cacao	8784	675	THCA	suklatei, cocoa
Thespesia populnea	8787	676	THPO3	badrerirt
Timonius corymbosus	8806	723	TICO7	
Timonius mollis	8807	724	TIMO4	
Timonius spp.	8808	1890	TIMON	
Timonius subauritus	8809	726	TISU3	
Timonius timon	8810	727	TITI	
Tournefortia argentea	8824	678	TOAR2	rirs, tree heliotrope
Trema cannabina	8827	679	TRCA33	chelodechoel
Trema orientalis	8831	204	TROR	chelodechoel
Trema spp.	8832	1900	TREMA	
Trichospermum ledermannii	8838	968	TRLE8	elsau, oleiulakersus
Tristiropsis obtusangula	8846	205	TROB7	
Vitex cofassus	8872	8911	VICO17	bars, beokel
Vitex spp.	8875	1910	VITEX	
Ximenia americana	8901	207	XIAM	kerekurlechol
Xylocarpus granatum	8903	685	XYGR	meduulokebong
Xylocarpus moluccensis	8904	686	XYMO2	puzzlenut
Xylocarpus spp.	8905	1920	XYLOC2	

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
adepurot	7903	MYIN3	Myristica insularis
african tulip tree	8644	SPCA2	Spathodea campanulata
amansis	8019	ORCA12	Ormosia calavensis
apgau	7679	MACO	Maranthes corymbosa
aralm	7962	NECE	Neuburgia celebica
arandu	6171	ARAL7	Artocarpus altilis
auri	6003	ACAU	Acacia auriculiformis
australian pine	6437	CALI8	Casuarina litorea
avocado	7211	PEAM3	Persea americana
baderirt	6742	COSU2	Cordia subcordata
badrerirt	8787	THPO3	Thespesia populnea
badrirs	6742	COSU2	Cordia subcordata
balsa	7980	OCPY	Ochroma pyramidale
banyan	7165	FIPR2	Ficus prolixa
banyan	7168	FISA	Ficus saffordii
banyan	7179	FIVI3	Ficus virens
baramits	6173	ARHE2	Artocarpus heterophyllus
bars	8872	VICO17	Vitex cofassus
bata	7211	PEAM3	Persea americana
bdull	6220	BAAS3	Barringtonia asiatica
beach almond	8750	TECA	Terminalia catappa
bedel	7618	MACA25	Macaranga carolinensis
bekersiu	860	CITRU2	Citrus spp.
beku	8060	PADU3	Pandanus dubius
belau	7307	GUSP3	Guettarda speciosa
belau	7251	GMEL	Gmelina elliptica
beokel	8872	VICO17	Vitex cofassus
beror	7125	EUPA29	Euodia palawensis
berrakelongor	8090	PAVA4	Pandanus variegatus
betel nut	6167	ARCA41	Areca catechu
biut	6200	AVAL	Avicennia alba
biut	6200	AVAL	Avicennia marina subsp. Marina
biut	6472	CETA2	Ceriops tagal
bkau	7679	MACO	Maranthes corymbosa
blacheos	7252	GMPA	Gmelina palawensis
blinding tree	7129	EXAG	Excoecaria agallocha
bngaol	8458	RHAP2	Rhizophora apiculata
bngei	8286	PONO10	Polyscias nodosa
bobai	6395	CAPA23	Carica papaya

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
bochela uchererak	7313	GUPA	Gulubia palauensis
breadfruit	6171	ARAL7	Artocarpus altilis
btaches	6341	CAIN4	Calophyllum inophyllum
budo	7867	MUCA4	Muntingia calabura
bungaruau	8283	POGR28	Polyscias grandifolia
buuch	6167	ARCA41	Areca catechu
buuk	8067	PAKA2	Pandanus kanehirae
calamondin	6583	CIMI3	Citrus mitis
chebeludes	6084	ALTE13	Allophylus ternatus
chebeludes	6084	ALTE13	Allophylus triphyllus
chebeludes	6085	ALTI2	Allophylus timorensis
chebibecb	7359	HELI9	Heritiera littoralis
chebiei	6175	ARMA28	Artocarpus mariannensis
chebingel	6395	CAPA23	Carica papaya
chebouch	8181	PIIN5	Pinanga insignis
chebtui	8687	SYRA6	Symplocos racemosa
chedebsachel	7059	EUAQ	Eugenia aquea
chelangel	8303	POOB8	Pouteria obovata
chelangel	8298	POCA6	Pouteria calcarea
chelebiob	6088	ALCA21	Alphitonia carolinensis
chelilai	7141	FABE	Fagraea berteroana
chelilairangebard	8271	PLRU2	Plumeria rubra
chelodechoel	8831	TROR	Trema orientalis
chelodechoel	8827	TRCA33	Trema cannabina
cheluu	6840	CYLU5	Cyathea lunulata
chemeklachel	7427	HOAM2	Horsfieldia amklaal
cheramall	7412	HITI	Hibiscus tiliaceus
cheritel	860	CITRU2	Citrus spp.
chermallucheang	6703	COBA17	Commersonia bartramia
chersachel	7430	HOPA10	Horsfieldia palauensis
chertochet	8054	PAAI	Pandanus aimiriikensis
chesdbuuch	8416	PTPA	Ptychosperma palauense
chesemiich	8751	TECR3	Terminalia crassipes
chesemiich	8752	TEED	Terminalia edulis
chesemolech	6343	CAPE15	Calophyllum pelewense
chesemolech	6344	CASO12	Calophyllum soulattri
cheskeam	8503	SAIN13	Samadera indica
chimoi	8213	PIGR6	Pisonia grandis
chinese banyan	7160	FIMI2	Ficus microcarpa

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
chirang	6370	CAOD	Cananga odorata
choes	8469	RHTA	Rhus taitensis
chuchab	6691	COSC13	Colona scabra
churur	8639	SOAL10	Sonneratia alba
cinnamontree	6564	CIVE2	Cinnamomum verum
cloves	7065	EUCA16	Eugenia caryophyllus
cocoa	8784	THCA	Theobroma cacao
coconut	908	CONU	Cocos nucifera
coffee	6684	COAR2	Coffea arabica
debechel	6575	CILI5	Citrus limon
dekemerír	6980	ELJO	Elaeocarpus joga
demailei	8181	PIIN5	Pinanga insignis
demailei	7377	HEEL9	Heterospathe elata
denges	6268	BRSE11	Bruguiera gymnorhiza
denges	6268	BRSE11	Bruguiera sexangula
dermarm	6118	ANEV	Angiopteris evecta
dermarm	7680	MAFR11	Marattia fraxinea
deuachel	6279	BUPA16	Buchanania palawensis
doko	7366	HESO	Hernandia sonora
dort	7477	INBI	Intsia bijuga
drumstick tree	7855	MOOL	Moringa oleifera
dudurs	8643	SOTO3	Sophora tomentosa
ebeludes	6085	ALTI2	Allophylus timorensis
ebibech	7359	HELI9	Heritiera littoralis
ebouch	7377	HEEL9	Heterospathe elata
ebtui	8687	SYRA6	Symplocos racemosa
edebsachel	7059	EUAQ	Eugenia aquea
edebsungelked	8019	ORCA12	Ormosia calavensis
elangel	8303	POOB8	Pouteria obovata
elangel	8298	POCA6	Pouteria calcarea
elebiong	6088	ALCA21	Alphitonia carolinensis
elilai ra ngebard	8269	PLOBO	Plumeria obtusa
elilai ra ngebard	8271	PLRU2	Plumeria rubra
elsau	8838	TRLE8	Trichospermum ledermannii
eluu	6840	CYLU5	Cyathea lunulata
emeridech	6461	CEMA20	Cerbera manghas
emeridech	6460	CEFL2	Cerbera floribunda
eremallueang	6703	COBA17	Commersonia bartramia
ersachel	7428	HONO2	Horsfieldia novoguineensis

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
ertochet	8072	PAMA32	Pandanus macrojeanneretia
ertochet	8076	PAPA38	Pandanus palawensis
esemiich	8759	TESA2	Terminalia samoensis
esemiich	8751	TECR3	Terminalia crassipes
esemiich	8752	TEED	Terminalia edulis
etkeam	8503	SAIN13	Samadera indica
eucalyptus	7034	EUDE2	Eucalyptus deglupta
eues	8469	RHTA	Rhus taitensis
eumail	7427	HOAM2	Horsfieldia amklaal
fish tail palm	6399	CAMI36	Caryota mitis
gagu	6437	CALI8	Casuarina litorea
guava	8356	PSGU	Psidium guajava
guiana chestnut	8036	PAAQ2	Pachira aquatica
honduras mahogany	8679	SWMA	Swietenia macrophylla
ianangi	6004	ACCO	Acacia confusa
imukurs	6197	AVBI	Averrhoa bilimbi
irang	6370	CAOD	Cananga odorata
ironwood	6434	CAEQ	Casuarina equisetifolia
ivory-nut palm	7798	MEAM4	Metroxylon amicarum
jiam	6137	ANBU3	Antidesma bunius
kaimito	6541	CHCA10	Chrysophyllum cainito
kalau	865	COSE2	Cordia sebestena
kalengui	6858	CYRA8	Cynometra ramiflora
kalm	7962	NECE	Neuburgia celebica
kalngebard	6449	CEPE2	Ceiba pentandra
kamatsiri	8220	PIDU	Pithecellobium dulce
kassod tree	6420	CASI4	Cassia siamea
katurai	8605	SEGR5	Sesbania grandiflora
keam	7475	INFA3	Inocarpus fagifer
kelau	865	COSE2	Cordia sebestena
kelela charm	6366	CABR18	Campnosperma brevipetiolatum
kemim	6541	CHCA10	Chrysophyllum cainito
kemim	6198	AVCA	Averrhoa carambola
kerekur	6584	CIRE3	Citrus reticulata
kerekurlechol	8901	XIAM	Ximenia americana
kertub	7124	EUNI8	Euodia nitida
kesengelngel	7849	MOCI3	Morinda citrifolia
kesiamel	8022	OSOL	Osmoxylon oliveri
kesiamel	8023	OSPA	Osmoxylon pachyphyllum

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
kesiamel	718	OSTR	Osmoxylon truncatum
kesiil	7091	EURE7	Eugenia reinwardtiana
ketenguit	6858	CYRA8	Cynometra ramiflora
ketoguit	7497	KAPA4	Kayea pacifica
keuert	6405	CACA28	Casearia cauliflora
kevert	6941	DRNI3	Drypetes nitida
kidel	7082	EUMA5	Eugenia malaccensis
kingkang	6583	CIMI3	Citrus mitis
kisaks	8295	POPI4	Pongamia pinnata
kiu	6366	CABR18	Campnosperma brevipetiolatum
kmekumer	8108	PAPA2	Parkia parvifoliola
kodenges	6268	BRSE11	Bruguiera gymnorhiza
kodenges	6268	BRSE11	Bruguiera sexangula
kohi	6684	COAR2	Coffea arabica
kokeal	6852	CYCI3	Cycas circinalis
kokeal	6852	CYCI3	Cycas micronesica
komunokí	7155	FIEL	Ficus elastica
koranges	6221	BARA5	Barringtonia racemosa
ksid	7142	FAKS	Fagraea ksid
kuabang	8356	PSGU	Psidium guajava
kuat	8577	SCHY5	Scyphiphora hydrophyllacea
las	8407	PTIN2	Pterocarpus indicus
las	7129	EXAG	Excoecaria agallocha
ledel	885	MAIN3	Mangifera indica
lemon	6575	CILI5	Citrus limon
litchi	7583	LICH4	Litchi chinensis
lius	908	CONU	Cocos nucifera
lulk	7165	FIPR2	Ficus prolixa
lulk	7168	FISA	Ficus saffordii
lulk	7160	FIMI2	Ficus microcarpa
lulu	7179	FIVI3	Ficus virens
madudiu	7506	KLHO	Kleinhovia hospita
mahogany	940	SWMA2	Swietenia mahagoni
mahogany	8679	SWMA	Swietenia macrophylla
malchianged	6575	CILI5	Citrus limon
malchianged	6572	CIAU	Citrus aurantifolia
malungkai	7855	MOOL	Moringa oleifera
mango	885	MAIN3	Mangifera indica
mangostin	7214	GAMA10	Garcinia mangostana

Palau Trees By Common Name			
Common Name	Number	NRCS Code	Scientific Name
maskerekur	8534	SAIN2	Sapium indicum
matib	6902	DIDI9	Diospyros discolor
mediuu liou	6175	ARMA28	Artocarpus mariannensis
meduu	6171	ARAL7	Artocarpus altilis
meduu	6178	ARTOC	Artocarpus spp.
meduulokebong	8903	XYGR	Xylocarpus granatum
mekekad	7602	LULI8	Lumnitzera littorea
mesbesibech	8213	PIGR6	Pisonia grandis
mesecheues	6043	AGPA19	Aglaia palauensis
mesecheues	6373	CAHI14	Canarium hirsutum
mesechoes	8649	SPDU3	Spondias dulcis
meseheol	8650	SPMO	Spondias mombin
meseiedel	8649	SPDU3	Spondias dulcis
meskui	6186	ASPA37	Astronidium palauense
miich	8750	TECA	Terminalia catappa
miich era ngebard	8036	PAAQ2	Pachira aquatica
nangiosikura	6883	DERE	Delonix regia
nangyo	6883	DERE	Delonix regia
necklace bead tree	8019	ORCA12	Ormosia calavensis
ngas	6434	CAEQ	Casuarina equisetifolia
ngel	7850	MOLA12	Morinda latibractea
ngel	7849	MOCI3	Morinda citrifolia
ngel ra ngebard	6129	ANRE	Annona reticulata
ngel ra ngebard	6131	ANSQ	Annona squamosa
ngemoel	7602	LULI8	Lumnitzera littorea
ngis	8123	PEAC6	Pemphis acidula
ngmui	8655	STAM10	Stemonurus ammui
norfolk island pine	6157	ARHE12	Araucaria heterophylla
ochaol	6702	COTE15	Combretum tetralophum
ochod	6557	CICA2	Cinnamomum carolinense
ochod	6561	CIPE6	Cinnamomum pedatinervium
ochod ra ngebard	6564	CIVE2	Cinnamomum verum
odebisech	7654	MAOD2	Mammea odorata
oil nut palm	6973	ELGU	Elaeis guineensis
olebtaches	6344	CASO12	Calophyllum soulattri
oleiulakersus	8838	TRLE8	Trichospermum ledermannii
oliulakerasus	8206	PIAR8	Pipturus argenteus
omail	6277	BUEN	Buchanania engleriana
omail	6279	BUPA16	Buchanania palawensis

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
omechidel	7777	MESE11	Meryta senfftiana
omechidel	8432	RAIN8	Rauvolfia insularis
ongolbeosachel	7654	MAOD2	Mammea odorata
ongor	8060	PADU3	Pandanus dubius
ongor	8085	PATE2	Pandanus tectorius
ongor	8056	PACO3	Pandanus compressus
ongor	8059	PADI29	Pandanus divergens
ongor	8061	PADU4	Pandanus duriocarpus
ongor	8078	PAPE	Pandanus peliliuensis
ongor	8072	PAMA32	Pandanus macrojeanneretia
ongor	8076	PAPA38	Pandanus palawensis
Orchid tree	6226	BAMO2	Bauhinia monandra
orenged	7087	EUPA3	Eugenia palauensis
oseked	7176	FITI2	Ficus tinctoria
oterebekii	6197	AVBI	Averrhoa bilimbi
otochel	8750	TECA	Terminalia catappa
ourderteboteb	6198	AVCA	Averrhoa carambola
paperbark guava	992	MEQU	Melaleuca quinquenervia
pink shower	6417	CAGR11	Cassia grandis
puzzlenut	8904	XYMO2	Xylocarpus moluccensis
ralm	6213	BAPA8	Badusa palauensis
rambotang	7952	NELA7	Nephelium lappaceum
rebotel	7078	EUJA4	Eugenia javanica
rebotel	7101	EUSU9	Eugenia suzukii
remiang	6852	CYCI3	Cycas circinalis
remiang	6852	CYCI3	Cycas micronesica
remiang	6853	CYRE11	Cycas revoluta
riamel	8091	PAED4	Pangium edule
rirs	8824	TOAR2	Tournefortia argentea
roro	7008	ERFU2	Erythrina fusca
roro	7016	ERVAO	Erythrina variegata
rose myrtle	8466	RHTO10	Rhodomyrtus tomentosa
royal palm	8491	ROOL	Roystonea oleracea
rríu	6928	DOSP3	Dolichandrone spathacea
rubber plant	7155	FIEL	Ficus elastica
sago palm	7799	MESA7	Metroxylon sagu
sapodilla	7674	MAZA	Manilkara zapota
sausab	6128	ANMU2	Annona muricata
shower tree	6415	CAFI3	Cassia fistula

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
siabong	6578	CIGR	Citrus grandis
siam	6137	ANBU3	Antidesma bunius
silver bush	8643	SOTO3	Sophora tomentosa
siu	8068	PAKO2	Pandanus korrensis
star apple	6541	CHCA10	Chrysophyllum cainito
suklatei	8784	THCA	Theobroma cacao
swampy mahogany	514	EURO2	Eucalyptus robusta
teak	8744	TEGR	Tectona grandis
tebechel	8462	RHMU	Rhizophora mucronata
telengtund	7565	LELE10	Leucaena leucocephala
telentundalel	6028	ADPA	Adenanthera pavonina
teuechel	7974	NYFR2	Nypa fruticans
tilol	7215	GAMA8	Garcinia matsudai
tilol	7219	GARU3	Garcinia rumiyo
titímel	8656	SPPI4	Spondias pinnata
toechel	7974	NYFR2	Nypa fruticans
tonget	8586	SEVE4	Semecarpus venenosa
travelers palm	8436	RAMA7	Ravenala madagascariensis
tree fern	6840	CYLU5	Cyathea lunulata
tree heliotrope	8824	TOAR2	Tournefortia argentea
tropical almond	8755	TEKA4	Terminalia kaernbachii
tsik	8744	TEGR	Tectona grandis
uab	6691	COSC13	Colona scabra
uaoch	7942	NEOP	Neisosperma oppositifolia
uch	7313	GUPA	Gulubia palauensis
udeuid	7672	MAUD	Manilkara udoido
udeuidar bekai	8217	PIUM2	Pisonia umbellifera
ukall	8601	SEKA2	Serianthes kanehirae
ukall ra ngebard	6058	ALFA5	Albizia falcataria
ukall ra ngebard	6061	ALRE	Albizia retusa
uosech (kall)	7151	FICA	Ficus carica
urur	8639	SOAL10	Sonneratia alba
velvet apple	6902	DIDI9	Diospyros discolor
	896	SYCU	Syzygium cumini
	6048	AICO2	Aidia cochinchinensis
	6059	ALLE	Albizia lebbeck
	6169	ARPI6	Arenga pinnata
	6156	AREX4	Araucaria excelsa
	7614	MAIN8	Macadamia integrifolia

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
	8307	PROB	Premna obtusifolia
	8846	TROB7	Tristiropsis obtusangula
	511	EUGL	Eucalyptus globulus
	7186	FLRU2	Flacourtia rukam
	6176	ARNO	Artocarpus nobilis
	7047	EUPI	Eucalyptus pilularis
	7053	EUSA	Eucalyptus saligna
	7054	EUSI2	Eucalyptus sideroxylon
	7273	GRRO	Grevillea robusta
	7381	HEBR8	Hevea brasiliensis
	6847	CYATH	Cyathea spp.
	7241	GICE2	Gironniera celtidifolia
	7831	MIPI9	Millettia pinnata
	7902	MYHY2	Myristica hypargyraea
	7948	NEFO2	Neonauclea forsteri
	8505	SASA10	Samanea saman
	7248	GLMA9	Glochidion marianum
	7249	GLRA4	Glochidion ramiflorum
	8129	PEMO13	Pericopsis mooniana
	6927	DOVI	Dodonaea viscosa
	6933	DRMU2	Dracaena multiflora
	715	MAPA28	Maytenus palauica
	8460	RHLA12	Rhizophora lamarckii
	8806	TICO7	Timonius corymbosus
	8807	TIMO4	Timonius mollis
	8809	TISU3	Timonius subauritus
	8810	TITI	Timonius timon
	6225	BABI6	Bauhinia binata
	6452	CEPA6	Celtis paniculata
	6588	CLFA6	Claoxylon fallax
	6589	CLLO5	Claoxylon longiracemosum
	6593	CLCA18	Cleistanthus carolinianus
	6594	CLIN8	Cleistanthus insularis
	6736	COMI6	Cordia micronesica
	6842	CYNI7	Cyathea nigricans
	6905	DIFE5	Diospyros ferrea
	6976	ELCA20	Elaeocarpus carolinensis
	7086	EUNI2	Eugenia nitida
	7128	EUTR13	Euodia trichantha

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
	7180	FICH	Finschia chloroxantha
	7254	GNGN	Gnetum gnemon
	7260	GOCA2	Goniothalamus carolinensis
	7638	MAPA6	Mallotus palauensis
	7642	MATI4	Mallotus tiliifolius
	7704	MECA21	Medusanthera carolinensis
	7851	MOPE2	Morinda pedunculata
	7880	MUFR3	Mussaenda frondosa
	8088	PAUT	Pandanus utilis
	8104	PALA5	Parinari laurina
	8308	PRPU5	Premna pubescens
	8474	RICA16	Rinorea carolinensis
	8667	STPA20	Sterculia palauensis
	8719	TAAU3	Tabernaemontana aurantiaca
	8743	TEST	Tecoma stans
	7429	HONU2	Horsfieldia nunu
	8398	PSRH2	Psychotria rhombocarpa
	6138	ANKU3	Antidesma kusaiense
	8412	PTLE3	Ptychococcus ledermannianus
	6063	ALBIZ	Albizia spp.
	6047	AGLAI	Aglaia spp.
	6083	ALLOP	Allophylus spp.
	6090	ALPHI	Alphitonia spp.
	6130	ANNON	Annona spp.
	6145	ANTID	Antidesma spp.
	6158	ARAUC2	Araucaria spp.
	6189	ASTRO4	Astronidium spp.
	6199	AVERR	Averrhoa spp.
	6205	AVICE	Avicennia spp.
	6223	BARRI	Barringtonia spp.
	6230	BAUHI	Bauhinia spp.
	6280	BUCHA	Buchanania spp.
	6345	CALOP	Calophyllum spp.
	6377	CANAR2	Canarium spp.
	6400	CARYO	Caryota spp.
	6408	CASEA	Casearia spp.
	6422	CASSI	Cassia spp.
	855	CASUA	Casuarina spp.
	460	CELTI	Celtis spp.

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
	6563	CINNA2	Cinnamomum spp.
	6592	CLAOX	Claoxylon spp.
	6595	CLEIS5	Cleistanthus spp.
	6687	COFFE	Coffea spp.
	6741	CORDI	Cordia spp.
	6783	CRYPT2	Cryptocarya spp.
	6847	CYATH	Cyathea spp.
	6854	CYCAS	Cycas spp.
	520	DIOSP	Diospyros spp.
	6942	DRYPE	Drypetes spp.
	6971	DYSOX	Dysoxylum spp.
	6983	ELAEO	Elaeocarpus spp.
	7013	ERYTH	Erythrina spp.
	7096	EUGEN	Eugenia spp.
	7127	EUODI	Euodia spp.
	7143	FAGRA	Fagraea spp.
	7171	FICUS	Ficus spp.
	7221	GARCI	Garcinia spp.
	7250	GLOCH	Glochidion spp.
	7253	GMELI	Gmelina spp.
	7362	HERIT2	Heritiera spp.
	7367	HERNA	Hernandia spp.
	7431	HORSF2	Horsfieldia spp.
	7566	LEUCA	Leucaena spp.
	7616	MACAD	Macadamia spp.
	7623	MACAR	Macaranga spp.
	7641	MALLO	Mallotus spp.
	7655	MAMME	Mammea spp.
	7659	MANGI	Mangifera spp.
	7671	MANIL	Manilkara spp.
	7706	MEDUS2	Medusanthera spp.
	7778	MERYT	Meryta spp.
	7800	METRO2	Metroxylon spp.
	7852	MORIN	Morinda spp.
	7882	MUSSA	Mussaenda spp.
	7904	MYRIS	Myristica spp.
	8010	HOMAL6	Homalanthus spp.
	8024	OSMOX	Osmoxylon spp.
	8084	PANDA	Pandanus spp.

Palau Trees By Common Name			
Common Name	**Number**	**NRCS Code**	**Scientific Name**
	8105	PARIN	Parinari spp.
	8215	PISON	Pisonia spp.
	8272	PLUME	Plumeria spp.
	8289	POLYS4	Polyscias spp.
	8306	POUTE	Pouteria spp.
	8310	PREMN	Premna spp.
	8418	PTYCH4	Ptychosperma spp.
	8463	RHIZO	Rhizophora spp.
	8653	SPOND	Spondias spp.
	8678	SWIET	Swietenia spp.
	8748	TERMI	Terminalia spp.
	8808	TIMON	Timonius spp.
	8832	TREMA	Trema spp.
	8875	VITEX	Vitex spp.
	8905	XYLOC2	Xylocarpus spp.
	300	ACACI	Acacia spp.
	6142	ANPO8	Antidesma ponapense
	6203	AVMA3	Avicennia marina
	6463	CERBE	Cerbera spp
	6622	CLPE2	Clermontia peleana
	6627	CLSI3	Clermontia singuliflora
	6778	CROR5	Cryptocarya oreophila
	510	EUCAL	Eucalyptus spp.
	7712	MECA9	Melastoma candidum
	7713	MESA3	Melastoma sanguineum
	8074	PAKA	Palaquium karrak
	8107	PAKO5	Parkia korom
	8505	SASA10	Albizia saman

APPENDIX 2 - REFERENCE INFORMATION

REF_FIPS_COUNTY_STATE			
STATECD	STATENM	COUNTYCD	COUNTYNM
15	Hawaii	001	Hawaii(ISLAND-HAWAII)
15	Hawaii	003	Honolulu(ISLAND-OAHU)
15	Hawaii	005	Kalawao(ISLAND-MOLOKAI-not the county)
15	Hawaii	007	Kauai(ISLANDS-KAUAI and NIHAU)
15	Hawaii	009	Maui(ISLANDS-MAUI, KAHOOLAWE, LANAI, and most of MOLOKAI)
60	American Samoa	20	Manu'a (ISLANDS – TAU, OFU, OLOSEGA)
60	American Samoa	30	Rose
60	American Samoa	40	Swains
60	American Samoa	10	Tutuila East
60	American Samoa	50	Tutuila West
64	Federated States of Micronesia	2	Chuuk
64	Federated States of Micronesia	5	Kosrae
64	Federated States of Micronesia	40	Pohnpei
64	Federated States of Micronesia	60	Yap
66	Guam	10	Guam
68	Marshall Islands	7	Ailinginae
68	Marshall Islands	10	Ailinglaplap
68	Marshall Islands	30	Ailuk
68	Marshall Islands	40	Arno
68	Marshall Islands	50	Aur
68	Marshall Islands	60	Bikar
68	Marshall Islands	70	Bikini
68	Marshall Islands	73	Bokak
68	Marshall Islands	80	Ebon
68	Marshall Islands	90	Enewetak
68	Marshall Islands	100	Erikub
68	Marshall Islands	110	Jabat
68	Marshall Islands	120	Jaluit

REF_FIPS_COUNTY_STATE			
STATECD	**STATENM**	**COUNTYCD**	**COUNTYNM**
68	Marshall Islands	130	Jemo
68	Marshall Islands	140	Kili
68	Marshall Islands	150	Kwajalein
68	Marshall Islands	160	Lae
68	Marshall Islands	170	Lib
68	Marshall Islands	180	Likiep
68	Marshall Islands	190	Majuro
68	Marshall Islands	300	Maloelap
68	Marshall Islands	310	Mejit
68	Marshall Islands	320	Mili
68	Marshall Islands	330	Namorik
68	Marshall Islands	340	Namu
68	Marshall Islands	350	Rongelap
68	Marshall Islands	360	Rongrik
68	Marshall Islands	385	Toke
68	Marshall Islands	390	Ujae
68	Marshall Islands	400	Ujelang
68	Marshall Islands	410	Utrik
68	Marshall Islands	420	Wotho
68	Marshall Islands	430	Wotje
69	Northern Mariana Islands	85	Northern Islands (ISLANDS Agrihan, Alamagan, Anatahan, Asuncion, Farallon de Medinilla, Farallon de Pajaros, Guguan, Maug, Pagan, Sarigan
69	Northern Mariana Islands	100	Rota
69	Northern Mariana Islands	110	Saipan
69	Northern Mariana Islands	120	Tinian
70	Palau	2	Aimeliik
70	Palau	4	Airai
70	Palau	10	Angaur
70	Palau	50	Hatoboheit
70	Palau	100	Kayangel
70	Palau	150	Koror
70	Palau	212	Melekeok
70	Palau	214	Ngaraard

REF_FIPS_COUNTY_STATE			
STATECD	STATENM	COUNTYCD	COUNTYNM
70	Palau	218	Ngarchelong
70	Palau	222	Ngardmau
70	Palau	224	Ngatpang
70	Palau	226	Ngchesar
70	Palau	227	Ngernmlengui
70	Palau	228	Ngiwal
70	Palau	350	Peleliu
70	Palau	370	Sonsorol

APPENDIX 3 -- FIPS CODES, UTM ZONES AND DECLINATIONS

(FIP Code) State or Territory Island	Latitude º ' "	Longitude º ' "	UTM Zone	Previous Declination	New Declination
(66) Guam					
(66) Guam	13º 26’ 40” N	144º 44’12” E	55	2 deg. East	1 deg East
(60) American Samoa			2		
(20) Manu'a	14º 15’ 00” S	167º 28’ 12” W	2	11 deg. East	11 deg. East
(30) Rose	14º 31’ 48” S	175º 52’ 12” W	2	11 deg East	11 deg. East
(40) Swains	11º 03’ 36” S	171º 04’ 48” W	2	11 deg East	11 deg. East
(10) Tutuila East	14º 18’ 00” S	169º 4’5 00” W	2	12 deg. East	12 deg. East
(50) Tutuila West	14º 20’ 00” S	170º 00’ 00” W	2	12 deg. East	12 deg. East
(69) Northern Marianas Islands			55		
			55		
(85) Agrihan	18 46 03 N	145 40 02 E	55	0 deg.	
(85) Alamagan	17 36 06 N	145 50 18 E	55	1 deg. East	
(85) Anatahan	16 21 28 N	145 39 58 E	55	1 deg. East	
(85) Asuncion	19 40 04 N	145 24 16 E	55	0 deg.	
(85) Farallon de Medinilla	16 01 09 N	146 04 39 E	55	1 deg. East	
(85) Farallon de Pajaros	20 32 17 N	144 53 53 E	55	1 deg. West	
(85) Guguan	17 18 54 N	145 50 52 E	55	1 deg. East	
(85) Maug	20 01 24 N	145 13 21 E	55	0 deg.	
(85) Pagan	18 06 39 N	145 46 20 E	55	0 deg.	
(100) Rota	14 09 13 N	145 12 11 E	55	2 deg. East	
(110) Saipan	15 11 33 N	145 44 53 E	55	1 deg. East	
(85) Sarigan	16 42 35 N	145 47 01 E	55	1 deg. East	
(120) Tinian	15 00 48 N	145 37 27 E	55	1 deg. East	
(64) Federated States of Micronesia					
(002) Chuuk					
Etal	05 34 05 N	153 35 10 E	56	6 deg. East	
Losap	06 53 44 N	152 44 01 E	56	5 deg. East	
Lukunor	05 30 22 N	153 47 58 E	56	6 deg. East	
Murilo	08 41 16 N	152 20 26 E	56	5 deg. East	
Nama	06 59 48 N	152 34 39 E	56	5 deg. East	
Namoluk	05 55 34 N	153 06 41 E	56	5 deg. East	
Namonuito	08 59 27 N	150 07 22 E	55	4 deg. East	
Nomwin	08 25 47 N	151 44 28 E	56	5 deg. East	
Pulap	07 38 41 N	149 25 15 E	55	4 deg. East	
Pulusuk	06 41 31 N	149 18 51 E	55	4 deg. East	
Puluwat	07 21 26 N	149 12 01 E	55	4 deg. East	

Satawan	05 19 30 N	153 44 12 E	55	6 deg. East
Truk	07 25 08 N	151 43 55 E	56	5 deg. East
(005) Kosrae				
Kosrae	05 18 58 N	162 59 02 E	58	8 deg. East
(040) Pohnpei				
Nukuoro	03 50 42 N	155 00 04 E	56	6 deg. East
Oroluk	07 37 44 N	155 09 41 E	56	6 deg. East
Pakin	07 04 53 N	157 48 20 E	57	6 deg. East
Pingelap	06 12 47 N	160 41 56 E	57	7 deg. East
Pohnpei	06 57 45 N	158 13 58 E	57	6 deg. East
(060) Yap				
Eauripik	06 41 14 N	143 04 55 E	55	3 deg. East
Elato	07 31 00 N	146 11 08 E	55	3 deg. East
Fais	09 45 54 N	140 31 20 E	54	2 deg. East
Faraulep	08 35 52 N	144 33 25 E	54	3 deg. East
Gaferut	09 13 58 N	145 22 59 E	55	3 deg. East
Ifilik	07 15 23 N	144 27 03 E	55	3 deg. East
Lamotrek	07 27 40 N	146 23 33 E	55	4 deg. East
Ngulu	08 29 37 N	137 21 48 E	55	1 deg. East
Olimarao	07 42 09 N	145 52 46 E	55	3 deg. East
Satawal	07 21 29 N	147 02 08 E	55	4 deg. East
Pikelot	08 05 16 N	147 38 08 E	55	4 deg. East
Sorol	08 08 00 N	140 24 39 E	54	2 deg. East
Ulithi	09 57 41 N	139 36 13 E	54	1 deg. East
West Fayu	08 05 21 N	146 44 28 E	54	3 deg. East
Woleai	07 22 32 N	143 54 50 E	54	3 deg. East
Yap	09 31 46 N	134 36 00 E	54	1 deg. East
(68) Marshall Islands				
Ailinginae	11 08 00 N	166 24 00 E	58	8 deg. East
Ailinglaplap	07 17 00 N	168 47 00 E	58	9 deg. East
Ailuk	10 12 40 N	169 59 02 E	58	8 deg. East
Arno	07 04 00 N	171 33 00 E	58	9 deg. East
Aur	08 16 00 N	171 06 00 E	59	9 deg. East
Bikar	12 12 00 N	170 06 00 E	59	8 deg. East
Bikini	11 37 00 N	165 33 00 E	59	7 deg. East
Ebon	04 35 00 N	168 44 00 E	59	9 deg. East
Enewetak	11 21 00 N	162 20 00 E	59	7 deg. East
Erikub	09 01 00 N	170 03 00 E	59	9 deg. East
Jabwot	07 47 00 N	168 59 00 E	59	8 deg. East
Jaluit	05 51 00 N	169 38 00 E	59	9 deg. East
Jemo	10 07 00 N	169 33 00 E	59	8 deg. East

Kili	05 39 00 N	169 04 00 E	59	9 deg. East
Kwajalein	08 43 00 N	167 44 00 E	58	8 deg. East
Knox	11 07 00 N	166 32 00 E	58	8 deg. East
Lae	08 55 00 N	166 16 00 E	58	8 deg. East
Lib	08 19 00 N	167 25 00 E	58	8 deg. East
Likiep	09 49 00 N	169 18 00 E	58	8 deg. East
Majuro	07 05 00 N	171 08 00 E	58	9 deg. East
Maloelap	08 45 00 N	171 03 00 E	58	9 deg. East
Mejit	10 17 00 N	170 54 00 E	58	8 deg. East
Mili	06 05 00 N	171 44 00 E	58	9 deg. East
Namorik	05 36 00 N	168 07 00 E	58	9 deg. East
Namu	07 32 00 N	168 53 00 E	58	9 deg. East
Rongelap	11 09 00 N	166 52 00 E	58	8 deg. East
Rongrik	unknown		58	
Taka	11 07 00 N	169 40 00 E	58	8 deg. East
Ujelang	09 46 00 N	160 58 00 E	58	7 deg. East
Ujae	08 56 00 N	165 45 00 E	58	8 deg. East
Utrik	11 14 00 N	169 51 00 E	58	8 deg. East
Wotho	10 11 00 N	166 00 00 E	58	8 deg. East
Wotje	09 28 00 N	170 15 00 E	58	8 deg. East
(70) Palau			53	
Angaur	06 54 00 N	134 09 00 E	53	1 deg. East
Babeldaob	07 30 00 N	134 36 00 E	53	1 deg. East
Eil Malk	07 09 09 N	134 21 25 E	53	1 deg. East
Ngercheu	07 05 20 N	134 16 20 E	53	1 deg. East
Peleliu	07 00 30 N	134 14 40 E	53	1 deg. East
Sonsorol	05 19 30 N	132 13 15 E	53	1 deg. East
(15) Hawaii				
003 Oahu			4	
001 Hawaii			5	
007 Kauai			4	
009 Maui			4	
Kahoolawe			4	
Molokai			4	
Lanai			4	
Niihau			4	

APPENDIX 4 – HANDHELD GPS COORDINATES

A. Overview

An objective of the inventory is to obtain accurate GPS coordinates for each field grid location. Coordinates are used to correlate plot information with remotely sensed imagery and data and in relocating the plot at future inventories. For the collection of GPS coordinates Alaska PNW-FIA uses Garmin GPSmap 76Cx GPS receivers.

B. When and where to collect readings

For each plot visited, collect a GPS reading that has averaged for at least 180 readings with an EPE (estimated position error) of 70 feet or less. Try to collect an adequate set of readings as soon as the center of subplot 1 is located. If unsuccessful, try again shortly before going to the next subplot. Success is GPS-generated coordinates based on a reading that has averaged for at least 180 readings with < 70 feet EPE. If there is no success at the plot center location, try to obtain coordinates in an opening or nearby area that gets better satellite coverage. If you can now successfully meet minimum requirements to collect, then be sure to enter the distance and azimuth to plot center in the appropriate fields (see GPS Info in the PLOT LEVEL DATA chapter). If you are still unsuccessful at getting good coordinates near the plot center, then collect them at one of the other three subplot centers and note accordingly.

NOTE: Allow at least 45 min to an hour between readings to allow for different or new satellites to come into clear view of the receiver. If more than one coordinate is collected, record the coordinate that is closest to subplot 1 center and has averaged for at least 180 readings. Write any other collected GPS coordinates or any notes regarding GPS use on the front of the location record. Record the azimuth and distance from the GPS reading location to the center of subplot 1.

** Important Note** the data recorder requires that the number of averaged readings be entered. The Garmin unit utilizes a number of readings counter and this number should be entered into the data recorder.

C. Recording GPS information

When using the GPS, record the Unit Number of the machine, UTM zone number, the Easting and Northing (X and Y) coordinates, the amount of time that readings that were averaged, the error statistic (the error displayed while the machine was averaging readings), the elevation of the reading, and the other items listed under Plot Data in the Husky Data recorder as necessary.

D. GPS keypad layout and commands

PWR: (red circle) key, hold down to turn the unit on and off. Press to adjust screen backlighting.

ENTER: (mark) press and release to enter highlighted option. Press and hold from any main menu/navigation screen to mark a waypoint.

MENU: press and release to view the Options Menu for a page. Press twice to view main menu.

QUIT: cancels the operation of the last button pressed and/or moves to previous screen

FIND: (MOB) Press to go to the find menu. Highlight waypoints and a list of saved waypoints will appear.

PAGE: press to move forward through main menu pages

IN: zooms in the display of the map screen

OUT: zooms out the display of the map screen

LEFT/RIGHT (Rocker Key) move the cursor left or right while entering data or selecting menu options

UP/DOWN (Rocker Key) move the cursor up and down while entering data or selecting menu options.

Initiate screen backlight: quickly press the PWR key.

Note: Adjust screen backlight: after turning the screen backlight on, press the power key again to brighten, press again to turn off.

E. GPS setup options

Listed below are the parameters to be set up before collecting satellite readings. Once these parameters are set up for the first time they will not need to be reset. Periodically (at least weekly) the unit should be checked to see that the settings have not been inadvertently changed.

GPS UNIT SETUP

The Garmin has several MAIN MENU screens that can be displayed or turned off. Some screens must be displayed in order to get coordinate information. Several screens display similar or the same information and it is recommended that these screens not be displayed.

When the unit is powered on, the “Main” Main Menu screen appears. Scroll to the right and highlight Setup and press ENTER key. Select the following fields one at a time and check that the correct information is set to display in each. To open each, scroll to it's icon and press Enter. Press DOWN key to select setup option, then press the ENTER key to change units. Scroll through drop down list and press enter to update/change field. When done, Press Quit to exit and choose new field from the Setup menu.

System: set "GPS" to battery saver, set "WAAS/EGNOS" to enabled, set "battery type" to alkaline (if using this type).

Time: set "Time Zone" to US Hawaii- there is not daylight savings time .

After system and time are set, scroll to the Units icon and press Enter.

Units: To scroll through the following pages use the up/down arrows.
Position Format: UTM/UPS
MAP DATUM: WGS 84
Distance/Speed: Statute
Elevation: Feet (ft/min)

Heading: "Display" set to Degrees and "North Reference" to Magnetic

IMPORTANT: Make sure that the MAP DATUM being used is the correct DATUM specified for your area. This is set on the UNITS page. Using a different datum will alter the coordinates significantly.

MAIN MENU PAGES
The Garmin has 6 main menu screens. These can be scrolled through by pressing "Page" to scroll forward or "Quit" to scroll back through them. The menu screens are: Main Menu, Find, Satellite, Trip Computer, Compass, and Map.

*Battery status and signal strength can be checked in the status bar at the top of all Main Menu/Navigation screens.

CUSTOMIZING NAVIGATION SCREENS
It is important that navigation screens are setup consistently among all units. Office defaults will be set for each unit. While most screens can be customized, it is recommended that the office defaults remain consistent. For most screens, small numbers will be selected to show more data fields.

While on a NAV screen, press MENU to open the options menu, to change data fields highlight "change data fields" and press ENTER. Now scroll to each individual field and press ENTER to open the drop down menu. Scroll through to highlight desired field and press ENTER to set. When all fields are changed, press QUIT to save all changes.

Satellite Page: This page shows how many satellites are being received by the unit and which ones are coming into view.

Trip Computer: It is recommended that the office defaults be left for this screen. At minimum Accuracy, Time, Bearing, Heading, Elevation, and Dist. To Destination should be kept on all units.

Compass: It is recommended this screen be left as set, Accuracy, Dist to Destination, Bearing, and Heading are most useful.

Map: The map screen will be set to show map only.

F. Operating the GPS on plot

Carry extra batteries at all times. The two AA-alkaline batteries begin to lose power after approximately eight hours of use. See Section J Batteries, for more details.

1. Turn on the GPS unit

2. Check to see if the unit is receiving satellite readings by pressing the PAGE key until the satellite status screen is visible. The satellite status screen shows 2 circles in the middle of the screen, and the satellite signal strength chart at the bottom. When the unit begins receiving satellites, the Acquiring Satellites message at the top will be replaced by the EPE and current UTM.

3. All recorded coordinates (UTM), elevation, number of readings, etc are entered under Plot Level Data (GPS Info) in the data recorder. If the coordinates are recorded at plot center, then azimuth and distance to plot center will be recorded as zero. See section H (Waypoints) below for a discussion of marking and averaging your location (LZ, RP, PC).

G. Collecting coordinates away from plot center

If you can not get an adequate set of readings at plot center, you may take readings at another location, and then record the azimuth and distance to plot center so that someone in the office can calculate the coordinates at plot center. Take the GPS unit to a location where you will be able to collect 180 averaged readings at < 70ft accuracy, and where you will be able to accurately measure the horizontal distance, azimuth and slope to plot center.

Record the coordinates, elevation, number of readings, azimuth, and distance to plot center under Plot Data in the data recorder.

H. Waypoints

CREATING A WAYPOINT (when coordinates are given)
A waypoint is a fairly precise location that a GPS user may assign a number and/or label to identify. For Pacific Islands PNW-FIA the location format is UTM/UPS (Universal Transerve Mercator/ Universal Polar Stereographic). This format requires this information: Zone- a 2 digit number (01-60) with a letter (C-X) attached. For our purposes, all zones in the western US will be any combination of the numbers 10,11 and letters U,T or S. Easting – a seven digit number (usually the first digit will be a zero) that represents distance form the eastern boundary of the particular zone. Northing also a

seven digit number that represents distance north of the equator(northing numbers are usually instrumental in determining what zone the coordinates are in).

To create a new waypoint with given UTM coordinates from existing plot data, turn on the GPS and then hold down the ENTER/MARK button. This will bring up the MARK screen with OK highlighted. Scroll up until the waypoint number field is highlighted. Press ENTER to rename the waypoint [(ex. "12345NAV") see below]. In naming the waypoint, add the letters NAV when using given coordinates from the folder data to distinguish from real-on-the- ground collected GPS points. Hit OK on the keypad screen when done. Highlight Location and press ENTER. Edit both lines of the location field by using the pop up keypad to edit the UTM field. When the coordinates are displayed correctly, highlight OK and press ENTER. Edit the Elevation field in the same manner. If you need to edit the icon, or note for a waypoint, use the UP/DOWN arrows to highlight the field you wish to change and press ENTER. Edit in same manner as just described.

When you have entered all the necessary data, highlight the OK button (bottom right of screen), and press ENTER. (To navigate to a newly created waypoint, see section I below.)

MARKING/AVERAGING YOUR CURRENT LOCATION

Storing the location of a vehicle, LZ or RP, or starting point is a good example on how you can use this feature in the field. Stored waypoints can be useful in approaching locations in a different way, taking a different route back to the LZ, or if you should get lost (see navigating to a waypoint).

To start, make sure the unit is on and you are receiving good signals. Check the Satellite screen (see Section F. Operating the GPS) and be sure that you are getting strong signals. Wait until the EPE (estimated position error) is 70 feet or less.

Hold down the ENTER/MARK button until the MARK screen appears. Before you move the GPS, you need to average the point's location. Scroll to the left and highlight AVG. Push ENTER to begin averaging. Watch the EPE and wait until the Measurement Count reaches 180. At this point, push and hold ENTER to save. Be sure to note the EPE before you save! The coordinates are now "locked in" and you can move the GPS without fear of changing the coordinates. Next, edit the waypoint name (see below). Finally, scroll to the bottom of the screen and choose OK to save the new waypoint. NOTE: when entering coordinates into the PDR for the PC, RP, LZ, etc., wait until after you have "averaged" the waypoint (don't read off and enter the coordinates prior to averaging).

The GPS's current location (under the assigned name), is now stored in its memory and can be used to navigate with.

NAMING COLLECTED/AVERAGED WAYPOINTS

The Garmin waypoint name allows us up to 14 numbers/letters.
The first five digits of the name should be the plot number (on the folder). (ex. if the plot number is 30 then plot number is 00030). The next 2-3 digits would be LZ, TR, RP, PC, SP2, SP3, SP4, or OTH.

LZ/TR = landing zone, or truck parking spot
RP = Reference Point
PC = Plot Center
SP2 = Subplot 2
SP3 = Subplot 3
SP4 = Subplot 4
OTH = Other, describe in GPS notes/location record

I. Navigating with the GPS

To begin navigation, you must first have a waypoint stored in the GPS unit (see Section H. Waypoints). A compass will be needed. (NOTE: keep the compass away from the body of the GPS to keep it from affecting the magnetic accuracy). Once you know which waypoint number you are going to travel towards, turn the GPS on and then, after the unit has locked onto satellites, push the FIND button. Highlight "Waypoints" in the menu, and press ENTER. A list of user-stored waypoints appears. Scroll down through the list until you find the name or number of the desired waypoint. (For example: a NAV waypoint as created in Section H) Highlight the desired waypoint and press ENTER. If you are not getting satellite signals then you will get the bearing and distance to the waypoint you selected from the last position the GPS unit obtained satellite signals. You may want to move in the general direction of the waypoint and hope that satellites will come into better view, or you may want to let the GPS sit for a few minutes to lock onto a signal.

Once you are sure you are receiving satellites you can highlight the GO TO tab on the bottom right of the screen to begin navigation. The map screen should appear and you can select which of the several navigation screens you wish to use by scrolling with the Page or Quit buttons. Follow the bearing using a compass, as you walk towards the waypoint the distance should steadily decrease. Eventually, as you get closer to the waypoint, the distance will get very small (about 10-30ft), and the bearing will begin to jump around dramatically. This means that you are very close to your destination (so look for the stake and witness trees if the waypoint is subplot 1).

Other data you might see on the navigation screens:

Bearing This is the direction to your destination from your present position, in degrees, from North.

Distance This is distance (measured in the Nav Units selected in Setup) to your destination.

Heading This is the direction you are moving (measured in degrees). When the heading and bearing are the same, you are traveling in a direct line to your destination.

Speed This is the rate that you are traveling. The unit of measure is selected in Setup - Nav Units.

J. Batteries

Garmin GPSmap76Cx units use two AA alkaline, NiMH, or lithium batteries; alkaline usually last for eight hours of use. Replace the batteries when the Power Indicator (found on the top of the navigation screens) is low. The GPS may have trouble locating satellites if the battery is low.

GPS Notes:

APPENDIX 5 – SURVEY GRADE GPS COORDINATES

Section 1 - Trimble GEOXH GNSS 6000 Unit

For general questions on operation of the GeoXH, crews can contact the FS GPS Front-Line Support at
1-866-560-6200 toll free and by email at support@geoposition.com.

Section 2 – Collecting a Subplot Rover File with the GEOXH 6000 Unit

For each of the 4 subplots at least 15 minutes (900 observations) of readings are collected. If a subplot is not sampled, see Section 3 to create a dummy rover file for the subplot.

1. Turn on the GeoXH by depressing the green button.
2. Tap "GeoXH" on the screen.
3. Tap "GNSS Application Launcher" to start the Terrasync data collection program.
4. Wait until a position is displayed instead of "?" in the "Status" screen.
5. Tap the drop down arrow in the upper left area of the screen (next to "Status").
6. Tap "Setup" in the drop down menu.
7. Tap the "Coordinate System" icon in the lower left area of the screen.
   When prompted, enter the password of "fia" to change the settings
   For the Pacific Islands:
      Confirm that System box has "UTM" selected.
      Confirm that the correct UTM zone for the plot is highlighted.
      Confirm that the correct datum is selected (WGS 84)
      Confirm that Altitude Reference box has "Mean Sea Level (MSL)" selected.
      Confirm that Altitude Units box has "Feet" highlighted.
8. Tap "Data" in the drop down menu.
9. In the File Name box, enter the rover file name in this format:
      st-cty-plot%-sp# (e.g. ca-029-05247-sp1 where st is the 2 character state code, cty is the 3 digit county code (including any leading zeros), plot% is the 5 digit plot number (including any leading zeros), sp# is "sp" followed by the 1 digit subplot number 1-4).
10. Tap "Create" at the bottom of the screen.
11. Tap the large "Point_generic" box.
12. Lay the GeoXH unit on a pack with the antenna patch relatively level. The pack should not be within 5 feet of a large diameter tree (over 20" DBH) if possible. The pack may be placed up to 30 ft from the subplot center. The pack should not be placed under heavy understory if possible.
13. Measure the horizontal distance (nearest 1/10th ft) and azimuth (0-359, nearest degree) **FROM** the center of the internal GeoXH antenna **TO** the subplot center.
14. Enter the subplot number, the horizontal distance (nearest 1/10th ft), and azimuth (nearest degree) in the Comment box in this format: sp=# hd=dd.d az=aaa (e.g. sp=2 hd=8.5 az=25) where # is the subplot number (1-4), dd.d is the horizontal distance, and aaa is the azimuth. Tap "Options" in the upper right part of the screen.
15. Tap "Offset" from the drop down menu.
16. Tap "Distance-Bearing" from the offset choices.

17. Enter the azimuth (nearest degree) in the Bearing box. Note: a “T” will be displayed in parenthesis next to “Bearing” if True North azimuths are expected (OR,WA, CA, Islands); an “M” if magnetic azimuths are expected (Alaska).
    Note: Tap the keyboard icon (bottom of screen) to bring up numbers if not displayed.
18. Enter the horizontal distance (nearest 1/10th ft) in the Horizontal distance box.
19. Leave the vertical distance “0.00”
20. Tap “Done” at the bottom of the screen.
21. Tap “Log” at the bottom of the screen to start logging satellite data. Notice that the number of recorded positions is displayed in the upper left corner of the screen.
22. Leave the GeoXH collecting data for AT LEAST 15 minutes (at least 900 positions).
    Note: Don’t stand over the unit as your body will block GPS signals.
23. After at least 15 minutes, tap “Done” at the bottom of the screen.
24. Tap “Close” at the bottom of the screen.
25. Tap “Yes” to confirm closing the rover file.
26. Tap “Data” in the upper left corner of the screen.
27. Tap “Exit” from the drop down menu to exit the Terrasync program.

GPS data collection for the subplot is completed. Repeat this procedure for remaining subplots.

NOTE: Completely shutdown the GeoXH power to conserve battery life between subplots.
To do this, press and hold the green power button for 3 seconds, then tap “Shutdown”.

Section 3 – Creating a Dummy Subplot Rover File with the GEOXH 6000 Unit

If the subplot is not sampled, a dummy rover file must be created on the GeoXH. This file may be created at any location (truck, field, office), but must be created before the rover files are transferred from the GeoXH to the laptop.

1. Turn on the GeoXH by depressing the green button.
2. Tap “GeoXH” on the screen.
3. Tap “GNSS Application Launcher” to start the Terrasync data collection program.
4. Wait until a position is displayed instead of “?” in the “Status” screen.
5. Tap the drop down arrow in the upper left area of the screen (next to “Status”).
6. Tap “Data” in the drop down menu.
7. In the File Name box, enter the rover file name in this format:
    st-cty-plot%-sp# (e.g. ca-029-05247-sp1 where st is the 2 character state code, cty is the 3 digit county code (including any leading zeros), plot% is the 5 digit plot number (including any leading zeros), sp# is "sp" followed by the 1 digit subplot number 1-4).
8. Tap “Create” at the bottom of the screen.
9. Tap the large “Point_generic” box.
10. Enter the subplot number and the reason the subplot was not GPSed in the Comment box.
11. Tap “Done” at the bottom of the screen.
12. Tap “Log” at the bottom of the screen.
13. Tap “Done” at the bottom of the screen.
14. Tap “Close” at the bottom of the screen.
15. Tap “Yes” to confirm closing the rover file.
16. Tap “Data” in the upper left corner of the screen.

17. Tap “Exit” from the drop down menu to exit the Terrasync program.

The dummy rover file has been created.

Section 4 – Downloading the Subplot GEOXH Rover Files to a Laptop

1. Connect the laptop to the GeoXH with the Trimble USB cable.
2. Turn on the GeoXH by pressing the green power button.
3. Start the “Trimble Data Transfer” program by either clicking on the desktop icon or by clicking on the Windows “Start” icon, then “All Programs”, “Trimble”, “Trimble Data Transfer”.
4. Click “Add”, then “Data file”.
5. Highlight the files you want to transfer (hold laptop “Ctrl” key to select more than 1 file), then click “Open”
6. Click “Browse” and select the “FIA_plot_GPS_Files” folder (folder must already be created).
7. Click “Transfer All”.
8. Click “Close” to exit the program.

The file has now been moved to the laptop.

Section 5 Deleting Subplot GPS Files From the GEOXH

Once a month, after all rover files have been transferred from the GeoXH to the laptop and the *.SSF files in the “FIA_plot_GPS_Files” folder have been backed up and sent to the office, you may delete the transferred rover files from the GeoXH.

1. Turn on the GeoXH by depressing the green button.
2. Tap “GeoXH” on the screen.
3. Tap “GNSS Application Launcher” to start the Terrasync data collection program.
4. Tap the drop down arrow in the upper left area of the screen (next to “Status”).
5. Tap “Data” in the drop down menu.
6. Tap the drop down arrow in the upper left area of the screen under “Data” (next to “New”).
7. Tap “File Manager” from the drop down menu.
8. Tap the rover file to be deleted to highlight it.
   Note: “Status” (shown at the bottom of the screen) will be “Transferred” if the rover file has previously been downloaded to the laptop.
9. Tap “Options” in the upper right corner of the screen
10. Tap “Delete” from the drop down menu. If the file hasn’t been transferred, a warning will appear-don’t delete the file unless certain it is not a valid subplot rover file that needs to be deleted.
11. Tap “Yes” to confirm delete.
12. When done deleting files, tap “Data” in the upper left corner of the screen.
13. Tap “Exit” from the drop down menu to exit the Terrasync program.

Section 6 – Charging the GEOXH Battery

The GeoXH battery life is about 10 hours continuous run time. The battery should be charged each night if possible. If not, conserve power by completely shutting down the unit when not in use by holding the green power button down for 3 seconds and then tapping “Shutdown”.

If camping for extended periods (1 week), a fully charged battery should allow GPS'ing of 5 full plots (20 subplots at 20 minutes run time per subplot is 6.7 hours, leaving 2 hours of battery life for navigation to plots).

The battery can be charged in the unit or removed from the unit.

1. To remove the battery pack: Pinch the latches together until the latches disengage from the handheld, and then slide the battery out.
2. To install the battery pack: Insert the battery pack into the battery opening and then push the battery firmly into the handheld, ensuring that both battery latches click into place fully.

APPENDIX 6 – LASER 200 INSTRUCTIONS

A. Overview

Accurate heights are necessary in our inventory in order to determine volume and for other uses. The Laser can be used to get fast and accurate tree heights. It can also be used to measure distances and % slope. This instrument is more fragile than the GPS units. Some precautions must be taken with the Lasers to keep them working properly. These are:

1. Never look at the sun through the scope. Looking directly at the sun can permanently damage your eyes.
2. Never point the Laser directly at the sun. Exposing the lens system to direct sunlight, even for a brief period, may permanently damage the laser transmitter.
3. Do not expose the Laser to extreme temperatures. It is rated for a temperature range of -22 to +140 deg. F. Don't leave the instrument in the vehicle during the heat of the day.
4. Do not use batteries with "voltage check" features built on the batteries. The battery case of the Laser is too narrow for these batteries, and they could get stuck in the instrument.
5. Do not drop the Laser. Immediately return it to its case when you get back to the vehicle. There is usually more danger of damaging the instrument in the vehicle than out in the woods.

B. Basic operation

All directions for using the Laser buttons are given assuming you are holding the instrument with the LCD display screen facing you and the 2 round lenses are facing the object you want to measure. The buttons will be referred to as:

L1	the left button closest to you
L2	the left button in the middle
L3	the left button furthest away from you
R1	the right button closest to you
R2	the right button in the middle
R3	the right button furthest away from you

Turn the Laser on by pushing L1 or R1
Turn it off by pushing L2 and L3 at the same time. The Laser may turn itself off after a period of inactivity. Once the instrument is on, push the R1 button to make the red dot appear in the sighting scope. If there is no red sighting dot, repeatedly push the L2 button until the red dot appears and is the correct brightness.
To light up the display screen, press L3. Press L3 again to turn off the light.

C. Settings

Make sure the settings are correct before using the Laser. To set the correct measurement units, go into the main menu and:

1. Press R2 or R3 to scroll through the menu until SYS is displayed in the upper right hand corner of the screen.
2. Press R1. ON or OFF will show in the center of the screen. FILTER will flash at the bottom.
3. Press R2 until OFFSET is flashing. The number displayed should be 0000.00.
4. Press R2 until PIVOT is flashing. The number displayed should be 0000.59. When this number is set at 0.00, the Laser is set to calculate heights using a tripod attached to the center of the instrument. The pivot point is the center of the Laser. We use the pivot value at 0.59 because this sets the pivot point at the rear of the instrument, and this allows you to shoot a height while using your head as the pivot point. To change this number, press L1 until the number you want

to change is flashing. Press L2 or L3 until the correct number is showing. When the number is set at 0000.59, press R1.

5. Press R2 until UNITS is flashing. Select F (feet) using the R1 button.
6. Press R2 again and D (degrees) should be flashing. If not, press R1 to toggle on D.
7. Press R2 again and % should be flashing. It should say ON. If not, press R1.
8. Press R3 twice to accept the new settings and back out to the main display.

D. Filter and Reflectors

When you are working in areas of dense brush, you need to make sure the Laser is giving you the distance to the correct target. The best way to do this is to use a reflector as a target and use the filter option on the Laser. The Laser will only lock onto the highly reflective targets and ignore the less reflective brush. To use the filter option:

1. Place a reflector (or have someone hold it) on the tree where it can be seen from the required distance. The Laser will not work in the filter mode without a reflector as a target.
2. Go to the main menu on the Laser and push R2 or R3 until SYS is displayed on the screen.
3. Press R1 to select the SYS option. The FILTER option will blink, and it will say the FILTER is OFF or ON.
4. Push R1 to toggle FILTER between ON and OFF.
5. Press R3 to save the desired setting and to back out into the main display. When the FILTER is on, FILTER will appear at the bottom of the screen when the Laser is measuring distances.

E. Distances and % slope

Horizontal distance (HD): Turn the Laser on. The top-middle of the LCD screen will say HD. Point the red sighting dot at the target. Press R1 and hold it down until the Laser locks on the target, then release. You can tell when the instrument locks onto it's target by sound. It buzzes while it is searching for the target, then beeps when it locks on to a target or there is an error. If you get an error message, simply aim again and press R1.

Slope distance (SD) and Vertical distance (VD): Push R2 or R3 until the correct display is shown. Then aim and press R1 until the Laser locks on target. Or, measure a horizontal distance, then push R2 until the correct display is shown.

% slope: Press R2 or R3 until INC is displayed. Then aim and press R1.

F. Tree heights

The best way to measure a tree height is to make sure you have a clear shot at the leader or a clear shot of the tree trunk. Make sure you are getting a distance to the tree trunk, and not some branches in front of it. If you can't get a clear shot at the leader or the tree trunk, use a reflector (see section D). Once you are in position with your target in sight, go to the main menu:

1. Push R2 or R3 until HT is displayed in the upper left of the screen.
2. Push R1 once, aim at the target, then push R1 until the Laser locks on target. This will measure the horizontal distance.
3. The down arrow will flash. Aim at the base of the tree and push R1 to get the % slope.
4. The up arrow will flash. Aim at the top of the tree and push R1 again to get another % slope.
5. Press R1 once more and the Laser will display the height. Make sure this height is reasonable before recording it in the Husky.

G. Gates

The gate option can extend the Laser's minimum range or restrict its maximum range. It is most often used to help you make sure you are hitting the right target when objects near you or just beyond your target might give you false readings. You don't have to set both gates. You will probably only need to set the short gate because of brush or fog between you and your target. You can set a gate by shooting a target or by entering distances into the instrument. To set a short gate by laser, go to the main menu and:

1. Press R2 or R3 until GATE is shown on the display.
2. Push R1 to select the gate option.
3. Press R1 to toggle the gate between ON and OFF.
4. Push R2. The S indicator will flash.
5. Aim at a target that is at the distance you want to set as the short gate and press R1.
6. Now you can either set a long gate, or press R3 to go back to save the short gate and return to the main menu. The S will be displayed when you are measuring distances to show the short gate is on.

To set a long gate:

7. Push R2. The L indicator will flash.
8. Aim at an appropriate target and press R1
9. Press R3 to save the gate and go back to the main display. The L will be displayed when measuring distances.
   The gates are reset to OFF when the Laser is turned off, but gate values are saved in memory. This means that if you have saved a gate and turn off the instrument, when you turn it back on the gate will be set to OFF. If you go back into the gate option and turn the gate ON, it will remember the last distances you shot for the long and short gates.

To clear out a gate value: Display the gate values by following the instructions in this section (section G). When the desired gate value is displayed, press and hold down R3 until the number is deleted.

H. Cumulative distances

A cumulative distance measurement allows you to move from one target point to the next, stopping at each one to measure the distance to the next target point. The Laser accumulates the measured distances in both slope and horizontal distances (SD and HD) to give you a running total.
To take a cumulative distance, go to the main menu and:

1. Press R2 or R3 until MULTI is displayed on the screen.
2. Press R1 to enter the MULTI option. DIFF will be displayed.
3. Press R2 once. CUM will be displayed.
4. Press R1. Either SEL or a number will be displayed. If SEL is displayed, HD will flash on and off. Press R1 to toggle between HD and SD. Press R2 when the correct indicator is flashing. If a number is displayed, that means there is already a cumulative distance saved on this instrument. You can either clear out this distance by holding down R3 until 0.00 appears, or continue to add to the distance by going to step 5.
5. Aim at the target and press R1 to fire the laser.
6. If you are not satisfied with the measurement, repeat step 5 to retake the measurement. If you are satisfied with the measurement, and wish to add it to your total, press R2. The new total will be displayed.

7. Repeat steps 5 and 6 to add more measurements to the total.

   You can choose whether you want horizontal or slope distances at any time. If a distance has been measured, you can change from slope or horizontal distance by pressing R3 twice. SEL will be displayed. Push R1 to toggle between SD and HD. Press R2 twice to get back to the total distance. Go to step 5 to add more distances.

   The cumulative measurement total is saved in memory even if the instrument is turned off. Turn the instrument on and scroll back to the MULTI-CUM option and resume the procedure with step 5. To clear out the current total and begin another series of measurements, hold down R3 while the cumulative distance is showing until the number is deleted.

APPENDIX 7 – SLOPE CORRECTION TABLE

PERCENT	EXPANSION FACTOR	EXPANSION FACTOR RECIPROCAL	--SLOPE DISTANCE-- 12.0 ft.	24.0 ft.	100 ft.	120.0 ft.
10	1.005	0.995	12.06	24.1	100.5	120.6
15	1.01	0.99	12.12	24.3	101.1	121.2
20	1.02	0.98	12.24	24.5	102	122.4
25	1.03	0.97	12.36	24.7	103.1	123.6
30	1.04	0.96	12.48	25.1	104.4	124.8
35	1.06	0.94	12.72	25.4	105.9	127.2
40	1.08	0.93	12.96	25.8	107.7	129.6
45	1.1	0.91	13.2	26.3	109.7	132
50	1.12	0.89	13.44	26.8	111.8	134.4
55	1.14	0.88	13.68	27.4	114.1	136.8
60	1.17	0.86	14.04	28	116.6	140.4
65	1.19	0.84	14.28	28.6	119.3	142.8
70	1.22	0.82	14.64	29.3	122.1	146.4
75	1.25	0.8	15	30	125	150
80	1.28	0.78	15.36	30.7	128.1	153.6
85	1.31	0.76	15.72	31.5	131.2	157.2
90	1.35	0.74	16.2	32.3	134.5	162
95	1.38	0.72	16.56	33.1	137.9	165.6
100	1.41	0.71	16.92	33.9	141.4	169.2
105	1.45	0.69	17.4	34.8	145	174
110	1.49	0.67	17.88	35.7	148.7	178.8
115	1.52	0.66	18.24	36.6	152.4	182.4
120	1.56	0.64	18.72	37.5	156.2	187.2
125	1.6	0.62	19.2	38.4	160.1	192
130	1.64	0.61	19.68	39.4	164	196.8
135	1.68	0.6	20.16	40.3	168	201.6
140	1.72	0.58	20.64	41.3	172	206.4
145	1.76	0.57	21.12	42.3	176.1	211.2
150	1.8	0.55	21.6	43.3	180.3	216
155	1.84	0.54	22.08	44.3	184.5	220.8

APPENDIX 8 - CRITERION RD 1000 ELECTRONIC RELASKOP USER GUIDE[2]

See complete Criterion RD 1000 manual for additional information

Low Battery Warning

The RD 1000 monitors the incoming battery voltage.

• When the voltage drops below 2.2V, the External LCD main display flashes "LobAt" every 5 seconds, alternating with the normally displayed information.

- You should replace the batteries as soon as possible.

• When the voltage drops below 2.0V, the "LobAt" message stops flashing and is displayed steady. At this point system operation is locked.

- You must replace the batteries to return to normal system operation.

Buttons

The RD 1000 has 11 buttons. Nine of these buttons are located on the keypad below the external LCD. The TRIGGER button is located at your index finger on the front of the unit, and the Scale Adjust button is located at your thumb on the back of the unit.

Key Pad

Figure #3 shows the keypad. The table below describes the function of each button.

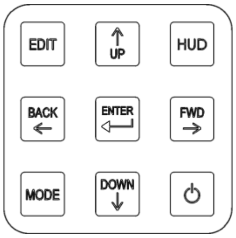
EDIT Activates the edit function.

↑ **UP** System Menu: Toggles value.
Edit function: Increases the digit value.
HUD brightness: Increases the value.

HUD When the Heads Up Display (HUD) is active, controls the in-scope LED.
Short Press: Activates the in-scope LED and displays the brightness value.
Long Press: Toggles the illuminated in-scope LED
Measurement Bar Scale from Solid to Gap or Gap to Solid.

BACK ← System Menu: Moves to the previous menu item.
Edit function: Moves to the previous digit (right to left).
Measurement: Moves to the previous step.

ENTER ↲ Confirms function. Selects value.



FWD → System Menu: Moves to next menu item.
Edit function: Moves to the next digit (left to right).

MODE Moves through the operating modes.

DOWN ↓ System Menu: Toggles value.
Edit function: Decreases the digit value.
HUD brightness: Decreases the value.
Measurement result: Downloads data.

POWER When unit is OFF:

• Press and hold for a minimum of 2 seconds turns ON the unit. For a brief time, all segments are displayed followed by the firmware revision number, and then the unit is ready for use.

• Press and Hold: external LCD shows all display segments
(10 seconds maximum).

When unit is ON:

• Short press turns the display backlight ON/OFF.

• Long press (2 seconds minimum) turns OFF the unit.

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[2] Copied from Criterion RD 1000 User's Manual, 2nd Edition, Laser Technology Inc, 2005

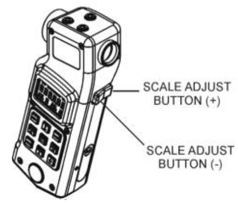
To conserve battery power, if no button presses are detected for a period of 15 minutes, the RD 1000 automatically turns itself OFF.

Other Buttons

Figure #4 shows the TRIGGER button and the SCALE ADJUST button.

TRIGGER

Short Press: (1) Activates the in-scope LED (stays lit for 30 seconds if no additional buttons are pressed).
(2) Accepts in-scope target points (such as tree base, etc.).
Press-and-hold: Activates the tilt sensor, and measurements are dynamically updated. Upon release, the inclination reading is locked.



SCALE ADJUST (+)

Increases the width of the illuminated in-scope LED
Measurement Bar Scale.
• Short Press: Increases the scale by one tick.
• Press-and-hold: Continuously increases the scale width change.

SCALE ADJUST (-)

Decreases the width of the illuminated in-scope LED
Measurement Bar Scale.
• Short Press: Decreases the scale by one tick.
• Press-and-hold: Continuously decreases the scale width change.

Dendrometer Functions

• **Diameter Mode:** Acquire a direct read-out of the height and diameter of a tree at any point (or multiple points) along the stem.
• **HT/Diameter Mode:** Determine the height at which a specific target diameter is reached.

Diameter Mode

Refer to the instructions below to acquire a direct read-out of the height and diameter of a tree at any point (or multiple points) along the stem □ from any convenient distance away.
1. Press the MODE button until the external LCD displays the DIAMETER Mode Indicator, the HD Measurement Prompt (flashing), the appropriate Units Indicator ("F" or "M"), and the EDIT Function Indicator. This is prompting you enter the horizontal distance to the target tree.
2. Enter the horizontal distance.

- Valid Values: 1.65 - 999.90 feet or 0.51 - 304.76 meters.
- To automatically fill-in: Aim and fire your LTI laser range finder to download the measured HD value into the numeric display. The display will automatically advance to the next step.
- To manually enter: Measure the distance using a tape measure, press the EDIT button, and use the arrow buttons to edit the value.

a. Press the UP or DOWN button to increase/decrease the value.
b. Press the FWD or BACK button to move to next/previous digit.
c. Press the ENTER button to accept the HD value.

- If you want to re-enter the horizontal distance (either manually or with a laser), press the BACK button and enter a new HD value.

3. The external LCD displays the DIAMETER Mode Indicator, the ANGLE Measurement Prompt Indicator (flashing), the DEG Units indicator, and the message “bASE” is prompting you to take the base angle measurement to the tree. This message is also displayed in the numeric area of the in-scope LED.
4. Looking through the sighting scope, press-and-hold the TRIGGER button to activate the illuminated in-scope LED Measurement Bar Scale.
5. Aim to the base of the target tree, and release the TRIGGER button to lock the inclination measurement.

- The inclination appears in both the in-scope LED and the external LCD, and is continuously updated as long as you hold the TRIGGER button.
- Upon release of the TRIGGER button, the in-scope LED flashes the locked inclination reading.

6. The external LCD displays the DIAM Measurement Prompt Indicator (flashing), the appropriate Units Indicator (“I” or CM”), and the EDIT Function Indicator prompting you to enter a diameter value.
Enter or edit the diameter value.

- Valid Values: 0.1 - 1400.0 inches or 0.3 - 3500.0 cm.

- If a previous diameter value was measured in the Diameter Mode, this value will appear in the main display. If you want to use this diameter value, go to step #7.
- To manually enter, press the EDIT button and use the arrow buttons to edit the value.
  a. Press the UP or DOWN button to increase/decrease the value.
  b. Press the FWD or BACK button to move to next/previous digit.

7. Press the ENTER button to accept the diameter value.
8. Press-and-hold the TRIGGER button to activate the tilt sensor and track up the tree from the base.
   - The tree height is dynamically updated in both the in-scope LED and the external LCD.
9. When the horizontal aiming marks align with the edges of the target tree, release the TRIGGER button to lock the inclination measurement.
   - The tree height is shown in both the in-scope LED and external LCD.
   - To re-check or re-position the height measurement point, press and hold the TRIGGER again to activate the tilt sensor and view the updated height measurement.

Once the desired tree height is showing in the displays:

• To download a serial data string through the serial port to an external data collector, press the DOWN button. The external LCD displays the DIAM Measurement Prompt Indicator (see step #6).

• In most situations, you will find that the Gap Bar Scale works best in the Height/Diameter Mode. However, you can toggle the illuminated in-scope LED measurement scale from Solid to Gap

Error Codes

An error code will be displayed if the RD 1000 detects a problem with a measurement. Depending upon the current function, error codes are displayed in either the in-scope LED or the external LCD display. The table below lists and explains the possible error codes.

Code	Explanation	Remedy
E01	Unstable inclination value. The instrument is too unsteady to produce an accurate reading.	• Steady the instrument before releasing the TRIGGER button.
E02	Calculation error. There was an error in performing an internal calculation caused by improper measurement geometry. Likely caused by a incorrectly entered data value, or an incorrect target shot from an external laser device.	• Re-enter or re-shoot the data.
E03	Data communication error. There was an error in a received serial data string from an external device.	• Verify that the laser and the RD 1000 are using the same units. • Verify the laser mode (it should be in HD or VD) and re-shoot.
E04	System memory error. There was some type of failure of the internal system memory. This represents a memory checksum failure of factory stored parameters.	• If the error persists, contact Laser Technology, Inc.
E05	Data entry error. An improper value was entered during a manual data edit operation (the entered data was outside of acceptable value limits).	• Check value and re-enter data.
E06	Unable to display the input value in the in-scope LED or external LCD.	• Re-enter data. • Hold the instrument within tilt limits.
	Unable to display the calculated value.	• Press the ENTER button to continue with the calculation.

APPENDIX 9 – MEASURING HEIGHTS USING A CLINOMETER

Tree heights can be measured using a clinometer and a measuring tape. The clinometer is only accurate if you use the HORIZONTAL DISTANCE from you to the tree when measuring a tree height.

To calculate a tree height, walk away from the tree and find a spot at least 1 tree length away where you can see both the top of the tree and the base of the tree. If the tree is 50 feet tall, then you need to be at least 50 feet away from the tree when you measure the height.

Walk uphill of the tree when measuring a height if possible. It is easier to see both the top of the tree and the base of the tree if you are up hill of it. Also, you do not have to walk as far away from the tree if you go uphill.

Look through your clinometer with one eye, and keep the other eye open. Keep both eyes open, and look up until the top of the tree is even with the horizontal line in the center of the clinometer. When the horizontal line in the clinometer is even with the top of the tree, read the number on the % (percent) scale of the clinometer that is touching the horizontal line in the clinometer. The % scale is usually on the right side on the inside of the clinometer. If you are unsure which scale to use, look into the clinometer and then tilt the clinometer up or down until the % symbol is visible on the scale.

Make sure you are far enough away from the tree so that your reading is not over 120%. The clinometer is not accurate when readings above 120% are used.

Now look through the clinometer with both eyes open and tilt the clinometer down until the horizontal line in the clinometer is even with the base of the tree. Read the number on the % scale that is touching the horizontal line in the clinometer.

The % scale of the clinometer is divided into 1% increments from 0 to + or – 70%. The distance between each small tic mark on the scale is equal to 1%. From + or – 70% and greater, the scale is divided into 2% increments. The distance between each small tic mark on this part of the scale is equal to 2%.

Most of the time you will read a positive number (+) while looking at the top of the tree, and a negative number (-) while looking at the base of the tree. ADD the number you observed while looking at the top of the tree with the number you observed while looking at the base of the tree. This gives you Total Percent.

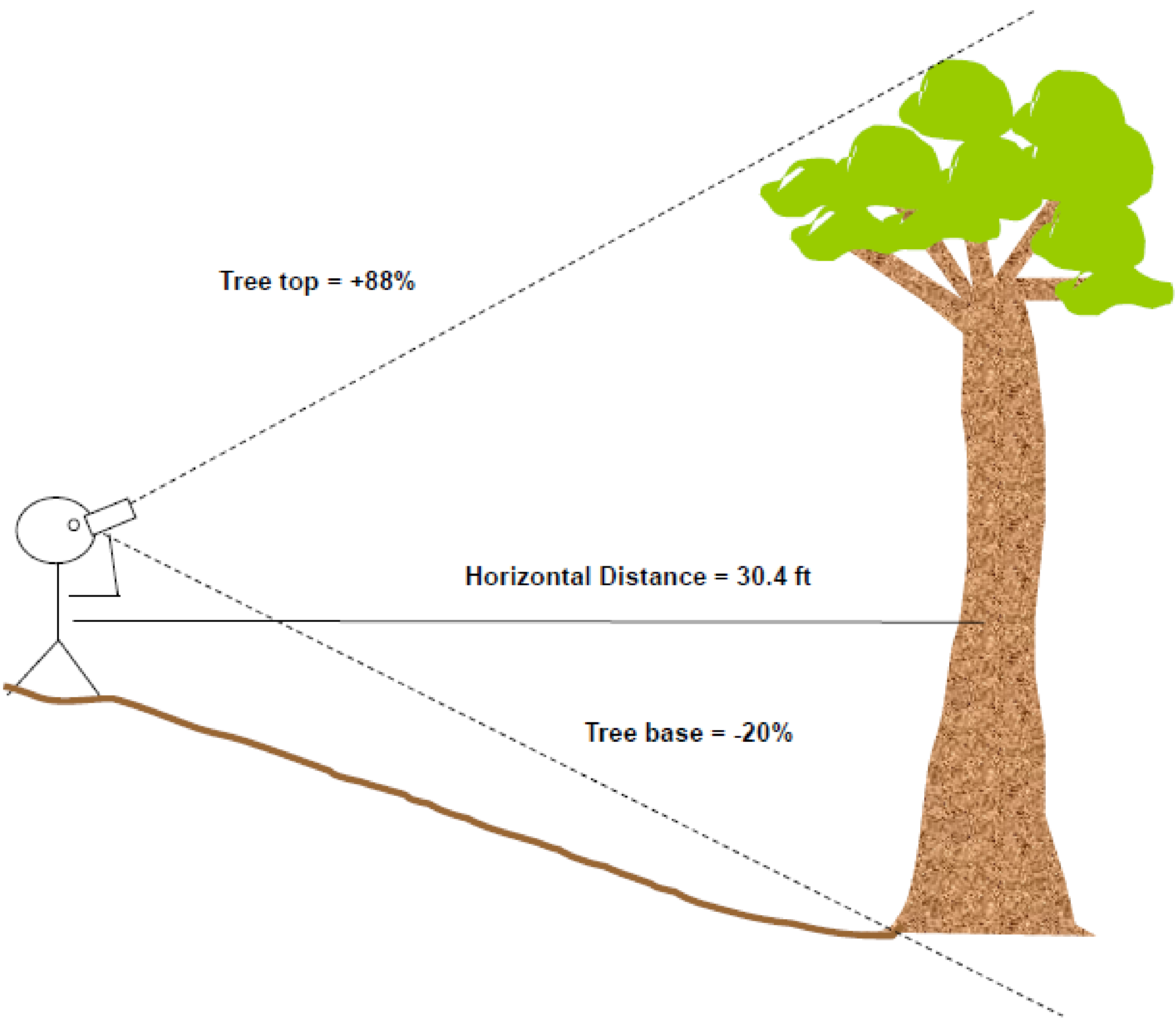
Special Case:
If you have to go down hill or very far uphill, you may read in your clinometer that both the top of the tree and the base of the tree are positive numbers on the % scale. Or you may have both the top of the tree and the base of the tree are negative numbers. If the top of the tree and the top of the root collar are the same sign (either both are positive

or both are negative) on the clinometer % scale, then SUBTRACT the tree top number and the root collar number. This gives Total Percent.

Measure the horizontal distance between where you took the readings with the clinometer and the tree. If you went up or down a hill to measure the height, then you must calculate the horizontal distance (see next page)

Multiply the Total Percent for your tree times the horizontal distance you just measured or calculated. Then divide this number by 100. This number is the height of your tree.

Example:



To calculate the height of this tree:

<u>(% Tree top) + or – (% Base of Tree) * (Horizontal Distance)</u>

100%

88% + 20% = 108% (these 2 numbers are added, since tree top % is positive and tree base % is negative)

108% * 30.4 feet = 3283.2

3283.2 / 100% = **32.8 feet is the height of this tree**

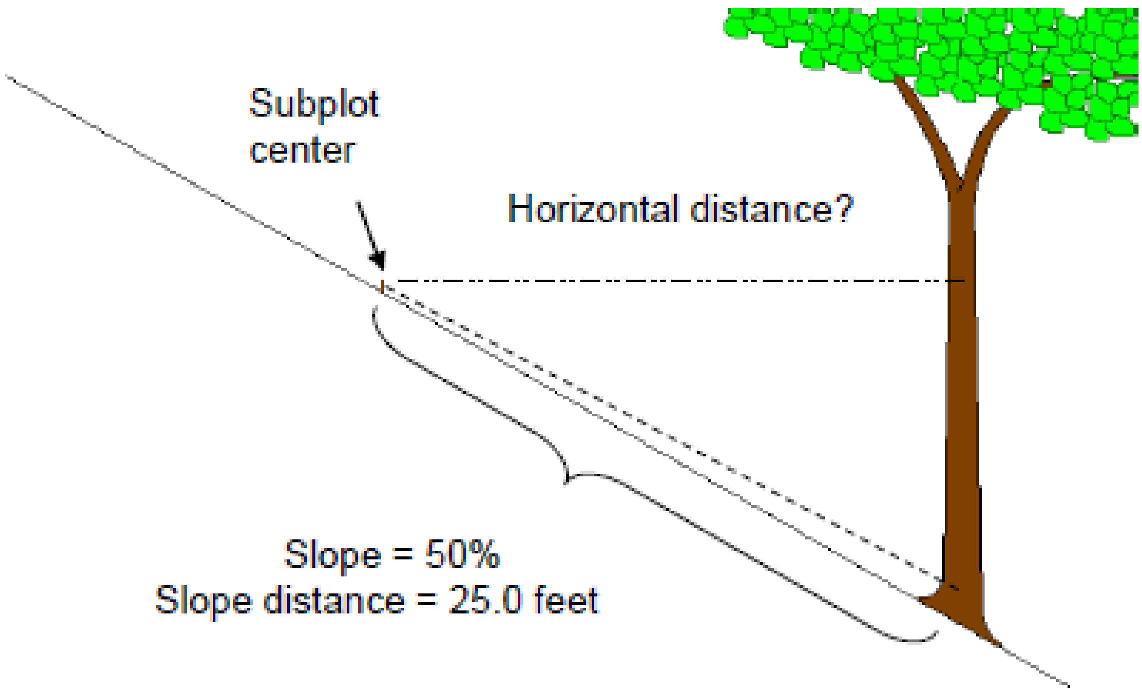
APPENDIX 10 – CALCULATING HORIZONTAL DISTANCE

When horizontal distance cannot be accurately measured it can be calculated by using percent slope, slope distance, and a slope correction table.

To calculate horizontal distance, first measure the slope distance.
Then use your clinometer to get a % slope. You should measure the % slope of the measuring tape. The clinometer should be at the level of your slope distance measuring tape.
Use the Slope Correction Table (see Appendix 6) to look up the expansion factor reciprocal for the % slope of the measuring tape.
Multiply the expansion factor reciprocal by the slope distance you measured.
This gives you the horizontal distance.

The horizontal distance will always be less than the slope distance.

Example:

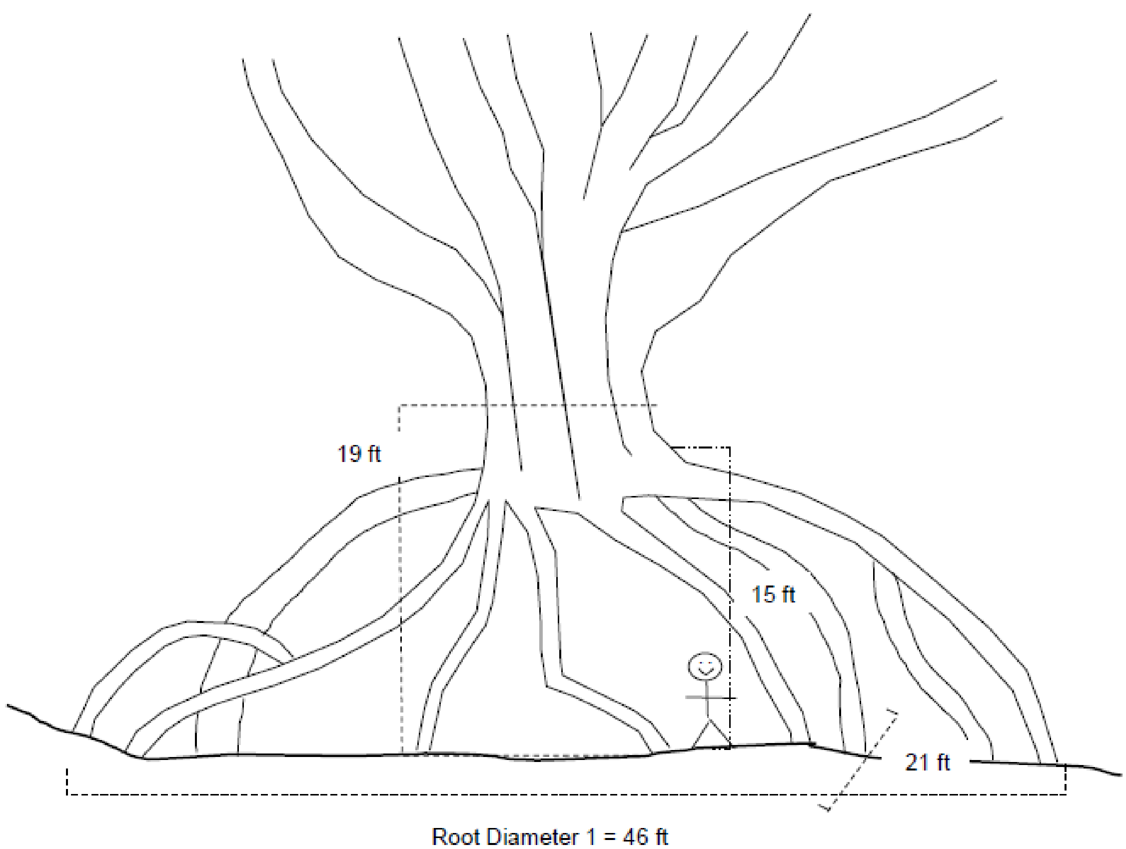


What is the horizontal distance from subplot center to this tree?

Expansion Factor Reciprocal for 50% slope = .89
.89 * 25.0 = 22.25 feet
The horizontal distance is 22.25 feet. This tree is within 24.0 feet of subplot center and is over 5.0 inches dbh, so it will qualify as a tally tree.
Slope distance = Horizontal distance when % Slope = 0

APPENDIX 11 – EXAMPLE OF BANYAN TREE MEASUREMENTS

For trees with roots tall enough where it is unreasonable to measure dbh:
Estimate one dbh, even if the tree is forked below 4.5 feet above the roots
4.5 feet with bracket from top of root collar to DBH = 18.5 feet (3.5 feet above top of root collar)
Diameter is estimated with a relaskop, so Diameter Check = 1
Rooting height is 15 feet.
Type of rooting system = 1
Root diameter 1 = 46 feet
Root diameter 2 = 21 feet
Prop root density = 1
Aerial root density = 0



APPENDIX 12 – DETERMINING SCALES AND BASELINES FROM A MAP OR PHOTO

Determining scale measuring object of known size on map or photo

First you must measure the length of an object on the map or photo whose actual length you know. This might be a football field, a city block, or a section of a road. You need to go out to the location mapped or pictured and measure the distance between two identifiable objects.
Once you have the two distances, you can find the scale

For example, suppose you have a photo and you need to determine the scale of the photo. Find 2 points on the ground that are visible on the photo and are easy to identify on the ground. Road intersections usually work well because they are usually easy to find on the photos and on the ground. Measure the horizontal distance between these 2 points on the ground (ground distance). Then measure the distance between the 2 points on the photo (photo distance).

If the distance between the 2 points is **1,200 feet** ground distance, and **.4 inches** photo distance, then the scale of the photos is calculated:

$$\frac{1{,}300 \text{ feet ground distance}}{.4 \text{ inches photo distance}} * \frac{12 \text{ inches}}{1 \text{ foot}} = \frac{(1{,}300 * 12)}{.4} = \frac{15{,}600 \text{ ground}}{.4 \text{ map}} = \mathbf{1:39{,}000}$$

This means that 1 inch on the photo is equal to 39,000 inches on the ground. Since 1 foot = 12 inches, then 39,000 inches/ 12 feet = 3,250 feet. Therefore, each inch on the photo is equal to 3,250 feet on the ground.

One exception for aerial photos is that this method assumes the two locations are at the same elevation--or that the terrain is flat. If you are using aerial photos, the terrain may not be flat. If there are hills, even moderate ones, the calculations can be thrown off. Try to measure the distance between 2 points on the ground that are similar in elevation.

Determining scale by comparing with another map or photo of known scale

Another way to calculate scale on an unknown map or photo is to compare it to a map with a known scale. For example, suppose you have an aerial photo where the distance between two hills is **3.12 inches**. You have a map of the same area at **1:24,000**, and on the map the distance between the hills is **1.3 inches**. The answer involves a little algebra. Since the ground distance is the same on both photo and map, we can create an expression for this ground distance for both, and then put them on either side of an equation. The ground distance can be found by multiplying the map/photo distance by the scale (in this case, by the inverse of the scale--notice how this makes the units cancel correctly). We need to find, for the photo, how many ground units are represented by one unit on the photo, so we use an *x* for this unknown quantity and solve for it:

$$3.12 \text{ in photo} * \frac{x \text{ ground}}{1 \text{ photo}} = 1.3 \text{ in map} * \frac{24{,}000 \text{ ground}}{1 \text{ map}} \text{ ; and}$$

$$3.12 \text{ in} * x \text{ ground} = 1.3 \text{ in} * 24{,}000 \text{ ground}$$

$$x = \frac{1.3 \text{ in} * 24{,}000}{3.12 \text{ in}} = 10{,}000$$

The scale for the photo is 1:10,000

Calculating a baseline on a map or photo

A baseline is often used in thick jungle where gps coordinates are difficult to obtain and/or navigation by using maps and aerial photography is difficult. A baseline is used to measure an azimuth and distance from a known point to the plot center. To calculate a baseline:

1. Determine the scale of the map or photo.
2. Measure the photo or map distance from a point of departure to the plot center. The point of departure is a know location that can be identified on the map or photo and can also be identified on the ground (a tree, intersection, house, etc)..
3. Calculate the ground distance using the photo or map scale and the photo or map distance.

For example:
The photo scale is 1:12,000
The photo distance from the corner of a house to the plot center is 1.13 inches. The house must be visible on the photo and identified on the ground.

$$1.13 \text{ inches photo} * \frac{12{,}000 \text{ ground}}{1 \text{ photo}} = 13{,}560 \text{ inches ground distance}$$

$$13{,}560 \text{ inches} * \frac{1 \text{ foot}}{12 \text{ inches}} = 1{,}130 \text{ feet ground distance}$$

Therefore, you must measure 1,130 feet from the corner of the house to arrive at plot center.

The azimuth from the house to the plot center can be calculated by:

1) Measure the azimuth between two points that are visible on the photos and the ground. Straight-line sections of road or powerlines often work well for determining baselines. Shoot the azimuth down one side of the road.
2) Draw a line in pencil on the photo between the 2 points you just measured the azimuth between. Extend this line as far as necessary.

3) Find a place that can be identified on the ground and the photo from which you can measure azimuth and distance to find plot center. This is your point of departure. Draw a line between plot center and the point of departure. This is your baseline. Extend this line as far as necessary so that it intersects the line drawn previously in number 2.
4) Calculate the azimuth from the known point of departure and the plot center using a protractor and the line drawn in number 2.

Adapted from Bryan Baker, Sonoma State University, Principles of map scale, www.sonoma.edu/GIC/Geographica/Mapinterp/Scale.htm, January, 1999

APPENDIX 13 – QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

QA/QC Plot Types

Blind Check – QA/QC personnel or a production crew remeasure a randomly selected, recently completed plot for the purpose of obtaining an estimate of measurement error. The blind check is completed without the inspectors looking at the production crew's data. The results of blind remeasurements are analyzed at a regional and national level. The blind plot data are not used to evaluate a crew's performance.

Cold Check – QA/QC personnel inspect a recently completed plot for the purpose of providing feedback about measurement quality and determining whether measurement quality objectives (MQO's) are being met by the production crew. This inspection is conducted by QA/QC personnel using the production crew's data without members of the production crew being present. The plot is checked for proper installation and the data are checked for accuracy and completeness. Cold checks are documented and tracked, and an effort is made to give all crew members adequate checks and feedback. Feedback about the results of the inspection is given during a review session with the QA/QC and production crews present after the inspection is complete. In addition, additional training should be given as needed based on the results of the cold check plots.

Due to the unique logistics of the Pacific Islands Inventory, blind and cold checks may be co-located, if necessary. Co-location is used to maximize the efficiency of the QA/QC crew by combining blind and cold check measurements on the same plot and at the same time. Given that there is only one production crew currently working in Hawaii, the only way that blind checks can be completed is by the QA/QC crew. In other island groups where there may be multiple crews working, blind checks can be completed by any production crew, regardless of whether a QA/QC is present or not. Because of the additional time required to conduct a co-located blind and cold check, the decision was made to thoroughly examine two randomly selected subplots: the remaining two will have a rougher examination focusing on the key components of the subplot. The two thoroughly examined subplots are the same for both the blind and cold checks.

Hot Check – A hot check is a location inspection where QA/QC personnel are present with the field crew during plot installation or re-measurement. The QA/QC crew will observe the production crew and check their data as the crew measures the plot. The purpose of this inspection is to provide on-the-spot feedback regarding procedural adherence, data quality, and safety; both positive and negative feedback is given.

Section 13.2 QA/QC Check Plot Selection

Co-located Blind and Cold Checks – A total of 4 percent is set as the goal for co-located blind and cold checks in PNW-FIA. Whether or not this goal can be met in the Pacific Islands is dependent on logistics and funding but it should be prioritized in order to maintain consistency in data quality with the other FIA units. The plots that are selected as QA/QC check plots will not be known to the field crew until the plot has been completed, uploaded to the MIDAS database, and written up. For the purposes of the blind check data analysis, blind check plots should be chosen randomly if at all possible. Cold check plots can be co-located with blind checks but they can also be conducted in a non-random fashion to provide specific feedback to certain crews. Blind and cold checks should be completed as soon as possible after the production crew's visit.

Hot Checks – The target for hot checks is 3% of field visit plots. Each crew member should receive at least one hot check early in the season. Hot checks can also be used throughout the year as a training tool for field crew members with poor performance, or to foster measurement consistency among the field crew.

Section 13.3 Co-Located Blind and Cold Check Procedures

Subsection 13.3.1 Blind Check Field Procedures

The QA/QC crew can and should review any data available to the current year's production crew. However, aside from the travel description, the current production crew's data should not be referenced during the blind check. The QA/QC crew should measure all the needed data items as an independent measurement of the plot, and the same amount of care and attention to detail should be taken as on a standard production plot. If time constraints limit the completion of certain data items, the production crew's data should not be copied into the blind check file.

All Plot Level Data must be completed as well as RP and GPS information, with new GPS coordinates collected by the QA/QC crew. All the Subplot Information and Condition Class data items must be completed for **all four subplots**.

Two randomly selected subplots are completely remeasured for the blind check. All data items for these two subplots are remeasured by the QA/QC crew. These subplots are done exactly as they would be done in a production setting. For the other two subplots, the Subplot Information data items are filled out, as well as additional Condition Class information if a new condition is encountered.

Notes:

- Plots, subplots, and microplots are measured by the QA/QC crew at the location of the pin installed by the production crew, even if the pin was installed in the wrong location. Similarly, tree diameters should be measured at the same location as the production crew, regardless of if the diameter was measured at the wrong location.

Length to diameter should be the length measured by the QA/QC crew to the point at which the diameter was measured by the production crew.

- While completing a blind check, it is important that the tree numbers assigned by the QA/QC crew correspond with the tree numbers assigned by the recent production crew and the initial production crew (when the plot is a remeasure). If the QA/QC crew encounters a tree missed by the initial crew but picked up by the recent production crew, the tree should get the same tree number as given by the recent production crew. If the QA/QC crew finds any trees missed by the recent production crew, the trees should be numbered starting at 999 and counting downwards. If the QA/QC crew encounters a tree incorrectly tallied by either the initial or recent production crew, the tree number given to this tree should be skipped and not assigned to any of the newly tallied trees on this subplot. All tree numbers between the recent production crew tally and blind check crew tally must match for the analysts to properly analyze the blind check data.

- The same RP as the production crew should be used by the QA/QC crew.

- Record Vegetation Profile and Invasive Plants cover estimates as seen at the time of the blind visit. If it is apparent that trampling of understory vegetation has affected measurements, make a subplot level note.

Subsection 13.3.2 Cold Check Procedures

After the blind check is completed for both subplots, the file is exited and a new cold check file is opened in the PDR. Creating this file populates the cold check fields with the data collected during the blind check. The QA/QC crew reviews the data line-by-line and compares the blind check data to a printed copy of the recent production crew's data. Any discrepancies are noted, and those which are outside of tolerance are marked in red. Each of these identified variables is revisited and reassessed to establish if the error was on the behalf of the QA/QC crew or the production crew. QA/QC crew members should alternate when the variables in question are reassessed. For example, if one individual was measuring tree length during the blind check, a different individual should remeasure tree length as part of the checking procedure. Attention should be paid to the procedure of error checking and obtaining "true" values for the variables in question. Errors on the behalf of the production crew or the QA/QC crew are then "fixed" in the cold check file to reflect the "true" value. If time constraints limit the completion of certain data items, the production crew's data should not be copied into the cold check file.

Notes:

- For the two subplots that are not measured in their entirety, subplot/microplot pin placement and condition class need to be checked. In addition, the subplots should be checked for added or missed trees and saplings.

- As with the Blind Check, plots, subplots, and microplots are measured at the pin location installed by the production crew. If a plot, subplot, or microplot was installed in the wrong location, make a note for the cold check report.

- If a tree diameter was measured at an incorrect location by the production crew, the diameter should be measured at the correct location by the QA/QC crew and given the appropriate length to diameter. Since diameters are measured at the production crews location for the blind check and that data is copied into the initial cold check file, it is important that the QA/QC notes if they have a tree where the diameter is measured at the incorrect location during the blind check so the proper diameter value can be entered for the cold check.

- RP information, photowork (RP and PC pinpricks, distance/azimuth calculations, etc.), and plot location (in the case of a new install) must be checked carefully to ensure that plots can be relocated in the future.

- The contents of the plot folder should be checked for completeness and accuracy, including: the plot card, photos, FDM explanation sheet, Ht/DBH graph, and boundary viewer printout.

- Benefit of the doubt, or tolerance in addition to the standards set in the manual, should only be given in situations in which the QA/QC crew is unable to demonstrate conclusive error on the part of the production crew, or in nebulous situations where the “true” answer is highly subjective (e.g., unclear condition class delineation).

Subsection 13.3.3 Integrity of the QA/QC Check Plot Data

It is fairly common to find some misplaced monumentation installed by the production crew during the QA/QC check. It is the policy of the PNW QA/QC program to never alter the data collected or monuments installed by the production crew **unless** they represent a hazard to the safety of future crews. QA/QC crews do not move PC pins, microplot pins, subplot pins, renumber trees, move nails, etc. In addition, data are not altered in the blind check file/plot card, or in the production file/plot card. There are two exceptions to this rule: a safety hazard, or a major error in the travel directions that would result in significant navigation delay for the future crew.

Section 13.4 Downloading Blind and Cold Check Data

Data from blind and cold checks must be run through the PDR edit program and FDM and uploaded to MIDAS just as if they were production plots.

Section 13.5 Cold Check Review Session

The review session following a QA/QC cold check is an opportunity for QA/QC personnel to provide production crews with constructive feedback to help improve data quality. The review session should take place as soon as possible after the plot has been checked and recommendations for work quality improvement have been written. All positive and negative aspects of the production crew performance should be discussed and documented, with an emphasis on techniques the production crew can use to improve data collection quality in the future.

APPENDIX 14 – DATA SHEETS

Plot Number ________ Year____ Month____ Day____

PLOT LEVEL DATA

STATE	
ISLAND	
COUNTY	
P2 VEG SAMP STATUS	
SURV GRD GPS COORD. COLLCTD	
DECLINATION	
QA STATUS	
CREW NUMBER (1-5)	
PLOT STATUS	
NONFOREST SAMPLING STATUS	
NONFOREST PLOT STATUS	
PLOT NONSAMP RSN	
NONFOR PLOT NONSAMP RSN	
SUBPLOTS EXAMINED	
SAMPLE KIND	
SAMPLE METHOD CODE	
PREVIOUS PLOT NUMBER	
TRAILS OR ROADS	
HOR. DIST TO IMP ROAD	
ROAD ACCESS	
PUBLIC USE RESTRICTIONS	
RECREATION USE 1	
RECREATION USE 2	
RECREATION USE 3	
WATER ON PLOT	
LANDOWNER PLOT SUM REQ	
Plot Notes:	
RP TYPE	
RP SPECIES	
RP DIAMETER	
RP AZIMUTH	
RP HOR DIST	
RP AZM/DIST TO SUBPLOT NUMBER	
RP Notes:	

Plot Number ________ Year____ Month____ Day____

UTM Zone: ____

GPS DATA

Handheld GPS Record 1

UNIT TYPE	SERIAL/UNIT #	GPS LOCATION TYPE:
EASTING:	NORTHING:	ELEVATION
ERROR:	READINGS:	
AZM TO CENTER:	DIST TO CENTER:	

GPS Note:

Handheld GPS Record 2

UNIT TYPE	SERIAL/UNIT #	GPS LOCATION TYPE:
EASTING:	NORTHING:	ELEVATION
ERROR:	READINGS:	
AZM TO CENTER:	DIST TO CENTER:	

GPS Note:

Handheld GPS Record 3

UNIT TYPE	SERIAL/UNIT #	GPS LOCATION TYPE:
EASTING:	NORTHING:	ELEVATION
ERROR:	READINGS:	
AZM TO CENTER:	DIST TO CENTER:	

GPS Note:

Handheld GPS Record 4

UNIT TYPE	SERIAL/UNIT #	GPS LOCATION TYPE:
EASTING:	NORTHING:	ELEVATION
ERROR:	READINGS:	
AZM TO CENTER:	DIST TO CENTER:	

GPS Note:

Handheld GPS Record 5

UNIT TYPE	SERIAL/UNIT #	GPS LOCATION TYPE:
EASTING:	NORTHING:	ELEVATION
ERROR:	READINGS:	
AZM TO CENTER:	DIST TO CENTER:	

GPS Note:

Plot Number ________

GPS DATA cont'd

Survey Grade GPS – Subplot 1

UNIT TYPE: **3**	SERIAL/UNIT #	GPS LOCATION TYPE: **15**
ANTENNA HT:	TIME REC STARTED:	TIME REC STOPPED **:**
AZM TO CENTER:	DIST TO CENTER:	CREW NUMBER
YEAR	MONTH	DAY

GPS Note:

Survey Grade GPS – Subplot 2

UNIT TYPE: **3**	SERIAL/UNIT #	GPS LOCATION TYPE: **16**
ANTENNA HT:	TIME REC STARTED:	TIME REC STOPPED **:**
AZM TO CENTER:	DIST TO CENTER:	CREW NUMBER
YEAR	MONTH	DAY

GPS Note:

Survey Grade GPS – Subplot 3

UNIT TYPE: **3**	SERIAL/UNIT #	GPS LOCATION TYPE: **17**
ANTENNA HT:	TIME REC STARTED:	TIME REC STOPPED **:**
AZM TO CENTER:	DIST TO CENTER:	CREW NUMBER
YEAR	MONTH	DAY

GPS Note:

Survey Grade GPS – Subplot 4

UNIT TYPE: **3**	SERIAL/UNIT #	GPS LOCATION TYPE: **18**
ANTENNA HT:	TIME REC STARTED:	TIME REC STOPPED **:**
AZM TO CENTER:	DIST TO CENTER:	CREW NUMBER
YEAR	MONTH	DAY

GPS Note:

Plot Number ________ Year____ Month____ Day____

CONDITON CLASS DATA

CONDITION CLASS NUMBER	1	2	3	4	5
CONDITION CLASS STATUS					
NONFOREST CONDITION CLASS STATUS					
NONFOREST CONDITION NONSAMP RSN					
NONFOREST COND CLASS SAMP STAT					
RESERVED STATUS					
OWNER GROUP					
FOREST TYPE					
STAND SIZE CLASS					
REGENERATION STATUS					
TREE DENSITY					
OWNER CLASS					
PRIVATE OWNER INDUSTRIAL STATUS					
ARTIFICIAL REGENERATION SPECIES					
STAND AGE					
DOMINANT TREE SPECIES 1					
DOMINANT TREE SPECIES 2					
DOMINANT TREE SPECIES 3					
DISTURBANCE 1					
DISTURBANCE YEAR 1					
DISTURBANCE 2					
DISTURBANCE YEAR 2					
DISTURBANCE 3					
DISTURBANCE YEAR 3					
TREATMENT 1					
TREATMENT YEAR 1					
TREATMENT 2					
TREATMENT YEAR 2					
TREATMENT 3					
TREATMENT YEAR 3					
CONDITION CLASS SLOPE					
CONDITION CLASS ASPECT					
PHYSIOGRAPHIC CLASS					
SLOPE SHAPE					
SLOPE POSITION					
PRESENT NONFOREST LAND USE					
CANOPY COVER SAMPLE METHOD					
LIVE CANOPY COVER					
LIVE PLUS MISSING CANOPY COVER					
TOTAL STEMS					
CONDITION NONSAMP RSN					

Condition Class Notes:

Plot Number ________ Year____ Month____ Day____

SUBPLOT DATA

SUBPLOT NUMBER	1	2	3	4
SUBPLOT STATUS				
SUBPLOT NONSAMP RSN				
NONFOREST SUBPLOT STATUS				
NONFOREST SUBPLOT NONSAMP RSN				
SUBPLOT CENTER COND				
SUBPLOT CENTER COND CLASS STAT CHANGE				
SUBPLOT CONDITION LIST				
MICROPLOT CENTER CONDITION				
SUBPLOT SLOPE				
SUBPLOT ASPECT				
SLOPE SHAPE				
SLOPE POSITION				
SNOW/WATER DEPTH				
PERCENT OF PIG DAMAGE (condition 1)				
PERCENT OF PIG DAMAGE (condition 2)				
PERCENT OF PIG DAMAGE (condition 3)				
P2 VEG SUBPLOT SAMP STATUS				
VEG NONSAMP RSN				
INVASIVE PLANT SUBPLOT STATUS				
INVASIVE PLANT NONSAMP RSN				
HIGH TALLY SAPLING PROCEDURES				

Subplot Notes:

MAPPING/BOUNDARY DATA

SUBPLOT #	PLOT TYPE	BOUNDARY CHANGE	CONTRASTING CONDITION	LEFT AZIMUTH	CORNER AZIMUTH	CORNER DISTANCE	RIGHT AZIMUTH

Boundary Notes:

Plot Number ________ Year____ Month____ Day____

SEEDLING COUNT

SPECIES	CC #	SUBPLOT 1 COUNT	CC #	SUBPLOT 2 COUNT	CC #	SUBPLOT 3 COUNT	CC #	SUBPLOT 4 COUNT

Seedling Notes:

Plot Number ________ Year____ Month____ Day____

P2 VEGETATION PROFILE DATA

(status and level of detail) NOTE: Separate sheet for each subplot/condition pair.

Subplot:__	Sbpt_Samp_Status: __	VEG_NS_Reason*:__	Cond_Num: __

Notes:

*: 04 – Time limitation; 05 – Lost data; 10 – Other

Vegetation Structure

VS Growth Habit	% COV Layer 1	% COV Layer 2	% COV Layer3	% COV Layer 4	% COV Total
Tally Trees					
Non-Tally Trees					
Shrubs/Wdy Vines					
Forbs					
Graminoids					
Moss/Bryophyte					

Species composition

Species Growth Habit	SPCD	Unique SP	Sp Notes	Specimen Collected? Label Number	Specimen Collected? Not Collected Reason	% Cover	Layer
Seedling /sapling							
Shrubs/ woody vines							
Forbs							
Grass-like							

Specimen non-collected reasons:

01 – Species locally sparse
02 – No mature foliage or reproductive parts present
03 – Hazardous situation
04 – Time limitation
05 – Plant collection not allowed
06 – Collected for immediate / local id
07 – Not required by unit
10 – Other

Vegetation Specimen Label Community Description notes:

Plot Number ________ Date____________

INVASIVE PLANTS DATA

SUBPLOT #	CONDITION CLASS #	SPECIES	UNIQUE SPECIES #	SPECIES CANOPY COVER	INVASIVE SPECIMEN COLLECTED	SPECIMEN LABEL #

Invasive Plant Data Notes:

TREE & SAPLING DATA Plot Number ________ Date____________

SUBPLOT NUMBER																		
TREE RECORD #																		
TREE TAG #																		
PREV TAG #																		
CONDITION CLASS #																		
PREV CONDITION CLASS #																		
PREV STATUS																		
PRESENT STATUS																		
WITNESS																		
STANDING DEAD																		
RECONCILE																		
SPECIES																		
AZIMUTH																		
HOR. DIST																		
SLOPE DIST																		
PREV DIAMETER																		
DIAMETER																		
DIAMETER CHECK																		
LENGTH TO DIAMETER																		
TYPE OF ROOTING SYS																		
# TREES SHARE ROOT SYS																		
ROOT DIAMETER 1																		
ROOT DIAMETER 2																		
ROOTING HEIGHT																		
PROP ROOT DENSITY																		
# OF BUTTRESSES																		
AERIAL ROOT DENSITY																		
PREV ACTUAL LENGTH																		
ACTUAL LENGTH																		
PREV TOTAL LENGTH																		
TOTAL LENGTH																		
LENGTH METHOD																		
PREV LENGTH METHOD																		
UNCOMP LIVE CROWN																		
COMPACTED LIVE CROWN																		
CROWN CLASS																		
BRANCHING CHARACT.																		
LENGTH TO CENTROID DIA																		
ACT LENGTH TO CENTR DIA																		
CENTROID DIA UPPER BOLE																		
PREV 2ND DIA UPPER BOLE																		
2ND DIA UPPER BOLE																		
PREV LENGTH TO 2^{ND} DIA																		
DAMAGE LOC 1																		
DAMAGE TYPE 1																		
DAMAGE SEV 1																		
DAMAGING AGENT 1																		
DAMAGE LOC 2																		
DAMAGE TYPE 2																		
DAMAGE SEV 2																		
DAMAGING AGENT 2																		
DECAY CLASS																		
EPIPHYTE LOADING																		
PRIORITY DAMAGE																		
PRIORITY DAMAGE SEV																		
ROT/MISS CULL																		
CAUSE OF DEATH																		
TREE NOTES																		

APPENDIX 15 – METRIC EQUIVALENTS AND AIDS

Length

1 inch	=	2.54 centimeters (cm.)
0.1 feet	=	3.048 centimeters (cm.)
1 foot	=	0.3048 meter (m.)
1 mile	=	1.609 kilometers (km.)

1 centimeter (cm.)	=	.03 foot (ft.)
1 meter (m.)	=	3.2808 feet (ft.)

Area

1 acre	=	0.4 hectare (ha.) (approximately)
5 acres	=	2 hectares (ha.) (approximately)
1,000 acres	=	404.7 hectares (ha.)
1 hectare	=	2.471 acres (ac.)
2.5 hectares	=	6 acres (ac.) (approximately)

Volume

1,000 cubic feet	=	28.3 meters (m^3)
1 cubic foot per acre	=	0.07 cubic meter per hectare (m^3/ha)

Condition class minimum area

0.4 hectares (1 acre)	=	4,000 square meters
	=	40 meters x 100 meters
	=	35 meter radius circle
1 acre	=	118 foot radius circle
	=	209 feet x 209 feet
	=	43,560 square feet

Metric System-length

1 meter	=	10 decimeters (dm.)
1 meter	=	100 centimeters (cm.)
1 meter	=	1,000 millimeters (mm.)

and:

.001 meters	=	1 millimeter
.01 meters	=	1 centimeter
.1 meters	=	1 decimeter
1 meter	=	1 meter
10 meters	=	1 decameter
100 meters	=	1 hectometer
1,000 meters	=	1 kilometer

Photo Scales

Scale	Length on Photo	Length on Ground
1:15,840	1 mm.	15.8 meters
1:24,000	1 mm.	24.0 meters
1:31,680	1 mm.	31.7 meters
1:40,000	1 mm.	40.0 meters
1:15,840	1 inch	1,320 feet
	0.1 inch	132 feet
	.05 inch (1/20)	66 feet
1:24,000	1 inch	2,000 feet
	0.1 inch	200 feet
	.05 inch (1/20)	100 feet
1:31,680	1 inch	2,640 feet
	0.1 inch	264 feet
	.05 inch (1/20)	132 feet
1:40,000	1 inch	3,333 feet
	0.1 inch	333 feet
	.05 inch (1/20)	166 feet

APPENDIX 16 – HELLO LETTER

United States Department of Agriculture	**Forest Service**	**Pacific Northwest Research Station**	**Anchorage Forestry Sciences Lab 161 East 1st Ave, Door 8 Anchorage, AK 99501 (907) 743-9414**

File Code: 4810

Date: Winter 2014

To Whom It May Concern:

Hello, we are researchers from the USDA Forest Service, Pacific Northwest Research Station. We are obtaining information on the forest resources of the Pacific Northwest from measurements taken on a large number of randomly located sample plots on forestland. We are visiting one of these plots in this general vicinity today.

We locate each plot from a sample selected on an aerial photograph. While at the site we record information pertaining to the type of terrain; tree species, heights, and diameters; insect and disease damage; mortality and regeneration; and the amount and kind of understory vegetation. Many of our field plots were first established in the early 1960's and have been revisited on a 10-year cycle.

With the measurements we take, analysts will develop basic information about the amount, condition, and change in the area's forest resource. Published reports contain data on forest land area and ownership, timber volume, forest growth, mortality and cut, potential productivity, and opportunities for silvicultural treatment.

If you are interested in learning more about our research plans, or care to see publications from previous inventories similar to this one, please contact Ray Koleser at (907) 748-9416 by telephone or by writing to:

Anchorage Forestry Sciences Laboratory
Forest Inventory and Analysis Program
161 East 1st Ave, Door 8
Anchorage, AK 99501

Sincerely,

Connie Hubbard
Alaska Data Collection Team Leader
Forest Inventory and Analysis

APPENDIX 17 – LANDOWNER CONTACT LETTER/DATA CONFIDENTIALITY

United States Department of Agriculture **Forest Service** **Pacific Northwest Research Station** **Forestry Sciences Lab**
P.O. Box 3890
Portland, Oregon 97208
(503) 808-2000

File Code: 4810
Date: Winter 2014

«OWN_NAME»
«ADDRESS_LINE_1»
«ADDRESS_LINE_2»
«ADDRESS_LINE_3»

Dear«OWN_NAME»

The Pacific Northwest Research Station is continuing to collect basic information about forest resources in Hawaii. The Forest Inventory and Analysis (FIA) Program at the station participates in a national effort to evaluate the status and condition of our nations forest ecosystems. Data is collected on FIA field plots so that we can determine the amount, condition and trends of Hawaii forested resources. The data will also allow us to detect and understand changes in local and regional forest health.

Data we collect from the field plot(s) on your property are combined with other plot data from adjoining areas and counties to provide information about resource conditions in the state of Hawaii. The data will not be identified in any way with your name or property and will have no bearing on your property taxes. Collected data are summarized, analyzed, and published in statistical and analytical reports for the United States, for Hawaii alone, and for various geographic areas within Hawaii and are available to the public.

Our records show that this year there is a field plot(s) that falls on your land. We request your permission to access your land to measure the trees and the vegetation on this plot. We only request your permission to access your land. We do not ask you to change your management practices, nor will our measurements affect any ongoing or planned activities for this site.

Our field staff will be in your area in 2014. If you wish, they will contact you before entering your land. We realize that working on your land is a privilege and we will respect your landowner rights at all times. We are prepared to honor any special conditions that you may require of us. Enclosed is a reply postcard for your response and any concerns, such as locked gates or other access problems. If you have any questions regarding this letter or pertaining to this inventory, please feel free to contact Connie Hubbard at (907) 743-9541 or chubbard@fs.fed.us.

We will be happy to share the resource information we gather from your property should you be interested. Thank you again for your cooperation in this study. Your participation is greatly appreciated.

Gretchen Nicholas
Program Manager
Forest Inventory and Analysis

Enclosure
County (**«COUNTYNTYCODE»**) Plot (**«PLOT»**)

United States Department of Agriculture | **Forest Service** | **Pacific Northwest Research Station** | **Forestry Sciences Laboratory**
P.O. Box 3890
Portland, Oregon 97208
(503) 808-2000

File Code: 4810

Date:

R E L E A S E

The USDA FOREST SERVICE assumes liability, pursuant to the Federal Tort Claims Act, for any damages caused by negligence of Forest Service personnel while upon the landowner's property in connection with the inventory of forest resources in the State of Hawaii, and the landowner shall not be liable for injuries occurring to Forest Service personnel for any reason except the negligent or wrongful acts of the landowner while they are on the property owned or controlled by the landowner.

County ___________________________

Plot Number ___________________________

Landowner ___________________________

Gretchen Nicholas
Program Manager
Forest Inventory and Analysis
Pacific Northwest Research Station
US Department of Agriculture

APPENDIX 18 – GLOSSARY

ACCESSIBLE FOREST LAND LAND THAT IS WITHIN SAMPLED AREA (THE POPULATION OF INTEREST), IS ACCESSIBLE AND CAN SAFELY BE VISITED, AND MEETS THE FOLLOWING CRITERIA: THE CONDITION HAS AT LEAST 10 PERCENT CROWN COVER BY TREES OF ANY SIZE, OR HAS HAD AT LEAST 10 PERCENT COVER IN THE PAST. ADDITIONALLY, THE CONDITION IS NOT SUBJECT TO NONFOREST USE THAT PREVENTS NORMAL REGENERATION AND SUCCESSION SUCH AS REGULAR MOWING, GRAZING, OR RECREATION ACTIVITIES

ACRE: A UNIT OF LAND CONTAINING 43,560 SQUARE FEET OF AREA.

AGE AT BREAST-HIGH THE NUMBER OF ANNUAL GROWTH RINGS BETWEEN THE BARK AND THE CENTER OF THE TREE AT 4.5 FEET ABOVE THE GROUND ON THE BOLE OF A TREE.

AGRICULTURAL LAND LAND MANAGED FOR CROPS, PASTURE, OR OTHER AGRICULTURAL USE. EVIDENCE INCLUDES GEOMETRIC FIELD AND ROAD PATTERNS, FENCING, AND THE TRACES PRODUCED BY LIVESTOCK OR MECHANIZED EUQIPMENT. THE ARE MUST BE AT LEAST 1.0 ACRE IN SIZE AND 120.0 FT WIDE AT THE POINT OF OCCURANCE

ASPECT THE DIRECTION A SLOPE FACES.

AZIMUTH: ANGLE OR DIRECTION FROM 1 TO 360 DEGREES. THE AZIMUTH PLUS 180 DEGREES IS THE BACK AZIMUTH.

BASAL AREA: (A) OF A TREE: THE CROSS SECTIONAL AREA OF A TREE AT BREAST HEIGHT ON THE STEM. (B) OF A FOREST OR STAND: THE CROSS-SECTIONAL AREA AT BREAST HEIGHT OF ALL TREES WITHIN A UNIT OF AREA.

BASAL AREA FACTOR (BAF): THE BASAL AREA PER UNIT OF AREA CORRESPONDING WITH A GIVEN CRITICAL ANGLE IN VARIABLE-RADIUS PLOT SAMPLING.

BLIND VARIANCE A RE-INSTALLATION DONE BY A QUALIFIED INSPECTION CREW WITHOUT PRODUCTION CREW DATA ON HAND; A FULL RE-INSTALLATION OF THE PLOT FOR THE PURPOSE OF OBTAINING A MEASURE OF DATA QUALITY. THE TWO DATA SETS ARE MAINTAINED SEPARATELY. DISCREPANCIES BETWEEN THE TWO SETS OF DATA ARE NOT RECONCILED. BLIND VARIANCES ARE DONE ON PRODUCTION PLOTS ONLY.

BOLE: TRUNK OR MAIN STEM OF A TREE.

BORDERLINE TREE:	A TREE THAT IS AT OR NEARLY AT THE LIMITING DISTANCE ASSOCIATED WITH A GIVEN BASAL AREA FACTOR. BORDERLINE TREES REQUIRED PRECISE CHECKING TO DETERMINE IF THEY ARE TO BE SAMPLED.
BREAST HEIGHT:	THE STANDARD HEIGHT, 4.5 FEET ABOVE GROUND LEVEL, AT WHICH DIAMETER OF A STANDING TREE OR SNAG IS MEASURED. ON SLOPING GROUND, BREAST HEIGHT IS MEASURED ON THE UPHILL SIDE OF THE BOLE.
CANKER:	LOCALIZED INJURY TO STEM, BRANCH OR ROOT; CAUSED BY DISEASE OR INSECTS.
CANOPY:	THE COVER OF FOLIAGE FORMED BY TREE CROWNS.
CANOPY CLOSURE	THE PERCENTAGE OF GROUND AREA COVERED BY THE VERTICALLY PROJECTED CROSS-SECTIONS OF TREE CROWNS
CENSUS WATER:	PERMANENT AREAS OF WATER MORE THAN 4.5 ACRES OR WIDER THAN 200 FEET.
CERTIFICATION PLOT	A PLOT INSTALLED BY A CERTIFICATION CANDIDATE. IT MAY BE A TRAINING PLOT OR A PRODUCTION PLOT. THE CANDIDATE WORKING ALONE INSTALLS THE PLOT.
COLD VARIANCE	AN INSPECTION DONE EITHER AS PART OF THE TRAINING PROCESS, OR AS PART OF THE ONGOING QC PROGRAM. NORMALLY THE INSTALLATION CREW IS NOT PRESENT AT THE TIME OF INSPECTION. THE INSPECTOR HAS THE COMPLETED DATA IN-HAND AT THE TIME OF INSPECTION. THE INSPECTION CAN INCLUDE THE WHOLE PLOT OR A SUBSET OF THE PLOT. DATA ERRORS ARE CORRECTED. COLD VARIANCES ARE DONE ON PRODUCTION PLOTS ONLY.
CLINOMETER	AN INSTRUMENT USED TO MEASURE PER CENT SLOPE
CONDITION CLASS	CONDITION CLASS IS DEFINED BY DIFFERENCES IN CONDITION STATUS, OR IN ONE OF THE SIX MAPPING VARIABLES: RESERVED STATUS, FOREST TYPE, OWNER GROUP, STAND SIZE, REGENERATION STATUS, AND TREE DENSITY.
CONIFER:	CONE-BEARING TREES, MOSTLY EVERGREENS, WITH NEEDLE OR SCALE-LIKE LEAVES BELONGING TO THE BOTANICAL GROUP GYMNOSPERMAE. ALSO REFERRED TO AS SOFTWOODS.
CONK:	THE FRUITING BODY OF A WOOD-DESTROYING FUNGUS WHICH PROJECTS FROM THE TRUNK, ROOTS OR OTHER TREE PARTS.

CROOK:	ABRUPT BEND OR CURVATURE IN THE BOLE OF A TREE; A CROOK IS A SOUND CULL DEDUCTION FROM GROSS MERCHANTABLE VOLUME.
CROWN:	THE PORTION OF A TREE CARRYING THE MAIN BRANCH SYSTEM AND FOLIAGE.
CROWN CLASS:	THE SOCIAL POSITION OF A TREE RELATIVE TO ITS ABILITY TO RECEIVE DIRECT SUNLIGHT.
CROWN RATIO:	THE PERCENT OF A TREE'S TOTAL HEIGHT WHICH HAS A LIVE CROWN.
CULL:	(A) TREES OR LOGS, OR PORTIONS OF LOGS THAT ARE OF MERCHANTABLE SIZE BUT ARE UNUSABLE FOR INDUSTRIAL WOOD PRODUCTS DUE TO DEFECTS (ROT OR FORM). (B) TO CULL A LOG OR PORTION OF A LOG WITH RESPECT TO GROSS MERCHANTABLE VOLUME (C) THE DEDUCTION MADE FROM GROSS VOLUME OF A TREE OR LOG TO ADJUST FOR SOUND OR ROTTEN DEFECTS.
ROUGH CULL:	PERCENTAGE DEDUCTION OF VOLUME LOST DUE TO BROKEN OR MISSING PARTS, FORKS OR CROOKS.
CULL ROT:	LOSS OF GROSS MERCHANTABLE VOLUME DUE TO ROT. VISUALLY INDICATED BY CONKS, ROTTEN SEAMS, ETC., CODED AS A CATEGORY OF PERCENTAGE OF VOLUME AFFECTED BY THE ROT.
CULTURAL NONFOREST STRINGER:	NONFOREST AREA OF CONSTRUCTED ROADS, RAILROADS, POWER-LINES, PIPELINES, AND CANALS WHICH ARE 1.0 ACRES OR LARGER WITH NO MINIMUM WIDTH REQUIREMENT.
CULTURALLY-KILLED TREE:	A TREE TALLIED OR RECONSTRUCTED AS LIVE AT OC3 BUT SINCE KILLED BY DIRECT HUMAN ACTIVITY AND NOT UTILIZED. THE TREE CAN BE STANDING, DOWNED, OR FELLED. INCLUDED ARE TREES KILLED BY LOGGING INJURY AND STILL STANDING. A TREE IS CULTURALLY-KILLED ONLY IF IT SHOWS NO SIGN OF LIFE OR IS PARTIALLY UPROOTED , LIVE, AND LEANS $\geq$45 DEGREES.
D.B.H.:	DIAMETER BREAST HEIGHT: THE TREE DIAMETER MEASURED AT BREAST HEIGHT--4.5 FEET ABOVE GROUND LEVEL.
DEAD TREE:	A TREE TALLIED OR RECONSTRUCTED AS LIVE AT OC3 BUT NOW DEAD. DEATH WAS NATURAL AND NOT DUE TO DIRECT HUMAN ACTIVITY. A TREE IS DEAD ONLY IF IT SHOWS NO SIGH OF LIFE OR IS PARTIALLY UPROOTED, LIVE, AND LEANS $\geq$45 DEGREES.
DEFOLIATOR:	AN INSECT, WHICH FEEDS UPON, OR STRIPS LEAVES AND NEEDLES FROM TREES.

DIAMETER	THE LENGTH OF A STRAIGHT LINE THROUGH THE CENTER OF AN OBJECT
DOMINANT TREE SPECIES	THE TREE SPECIES THAT IS THE MOST ABUNDANT AND NOT OVERTOPPED IN A CONDITION CLASS
EPIPHYTE:	A PLANT THAT USES A TREE FOR PHYSICAL SUPPORT, BUT WHICH DOES NOT DRAW NOURISHMENT FROM THE TREE
EVEN-AGED STAND:	A STAND IN WHICH INDIVIDUAL TREES ORIGINATED AT APPROXIMATELY THE SAME TIME. SPECIFICALLY, THE STAND MUST NOT BE CLASSIFIED AS NONSTOCKED, AND AT LEAST 70 PERCENT OF THE LIVE TREES PRESENT MUST BE WITHIN 30 YEARS OF ONE ANOTHER IN TOTAL AGE.
FIELD GRID LOCATION:	THE CENTER OF SUBPLOT 1 ON THE STANDARD PLOT LAYOUT. THE FIELD GRID LOCATION IS PINPRICKED ON PLOT PHOTOS IF THE PLOT WAS PREVIOUSLY VISITED; THIS INCLUDES ESTABLISHED PLOTS THAT CAN'T BE FOUND. THE FIELD GRID LOCATION IS PINPRICKED ON THE NEW PHOTOS FOR PLOTS THAT WERE NOT VISITED PREVIOUSLY.
FIXED-RADIUS PLOT:	A CIRCULAR SAMPLED AREA WITH A SPECIFIED RADIUS IN WHICH ALL TREES OF A GIVEN SIZE, SHRUBS, OR OTHER ITEMS ARE TALLIED.
FORB:	A BROAD-LEAVED HERBACEOUS PLANT AS DISTINGUISHED FROM GRASSES, SHRUBS AND TREES.
FOREST TYPE:	CLASSIFICATION OF A FOREST SITE BASED ON THE TREE SPECIES PRESENT, PLANT COMMUNITY, AND OTHER SITE CHARACTERISTICS.
GLC:	GROUND LAND CLASS.
GROUND LAND CLASS:	A CLASSIFICATION OF LAND BY USE. THE MINIMUM AREA FOR CLASSIFICATION IS 1.0 ACRE. EACH MAPPED CONDITION CLASS REQUIRES A GROUND LAND CLASS.
HARDWOODS:	BROAD-LEAVED AND DECIDUOUS TREES AS OPPOSED TO HAVING NEEDLES. TREES BELONGING TO THE BOTANICAL GROUP ANGIOSPERMAE.
HARVESTED TREE:	A TREE TALLIED OR RECONSTRUCTED AS LIVE AND >5.O IN. D.B.H. AT A PREVIOUS INVENTORY, BUT SINCE HARVESTED FOR INDUSTRIAL SUPPLY, FIREWOOD, LOCAL USE, OR INCIDENTAL REASONS.

HEARTWOOD:	THE INNER, NONLIVING CORE OF WOOD IN A TREE BOLE, GENERALLY DARKER THAN SAPWOOD.
HECTARE:	A METRIC UNIT OF AREA EQUAL TO 10,000 SQUARE METERS. 2.47 ACRES.
HORIZONTAL DISTANCE	THE AMOUNT OF SEPARATION BETWEEN TWO POINTS THAT IS MEASURED AS IF BOTH POINTS ARE ON THE SAME PLANE; HORIZONTAL DISTANCE MUST BE CALCULATED FROM SLOPE DISTANCE IF THE 2 POINTS CANNOT BE MEASURED ALONG THE SAME PLANE
HOT VARIANCE	AN INSPECTION NORMALLY DONE AS PART OF THE TRAINING PROCESS. THE INSPECTOR IS PRESENT ON THE PLOT WITH THE TRAINEE AND PROVIDES IMMEDIATE FEEDBACK REGARDING DATA QUALITY. DATA ERRORS ARE CORRECTED. HOT VARIANCES CAN BE DONE ON TRAINING PLOTS OR PRODUCTION PLOTS.
IMPROVED PASTURE	LAND THAT IS CURRENTLY MAINTAINED AND USED FOR GRAZING. EVIDENCE OF MAINTENANCE, BESIDES THE DEGREE OF GRAZING, INCLUDES CONDITION OF FENCING, PRESENCE OF STOCK PONDS, PERIODIC BRUSH REMOVAL, SEEDING, IRRIGATION, OR MOWING.
INCLUSION	AN AREA THAT WOULD GENERALLY WOULD BE RECOGNIZED AS A SEPARATE CONDION, EXCEPTH THAT IT IS NOT LARGE ENOUGH TO QUALIFY. FOR EXAMPLE, A ½ ACRE POND WITHIN A FORESTED STAND.
INCREMENT:	THE INCREMENT IN D.B.H. OF A TREE IN A SPECIFIED PERIOD OF TIME.
INGROWTH TREE:	A TREE THAT HAS GROWN PAST A DIAMETER THRESHOLD ON A FIXED-RADIUS PLOT SINCE PREVIOUS INVENTORY.
INSPECTION CREW	A CREW OF QUALIFIED QC/QA INDIVIDUALS WHOSE PRIMARY RESPONSIBILITY IS THE TRAINING, CERTIFICATION AND INSPECTION OF PRODUCTION CREWS.
MAINTAINED ROAD	ANY ROAD, HARD TOPPED OR OTHER SURFACES, THAT IS PLOWED OR GRADED PERIODICALLY AND CAPABLE OF USE BY A LARGE VEHICLE. RIGHTS-OF-WAY THAT ARE CUT OR TREATED TO LIMIT HERBACEOUS GROWTH ARE INCLUDED IN THIS AREA.
MORTALITY TREE:	SEE DEAD TREE.
MYCELIUM:	THE VEGETATIVE PART OF A FUNGUS; A MASS OF THREAD-LIKE FILAMENTS.

NONFOREST INCLUSION: AN AREA THAT IS NONFOREST BUT LESS THAN 1.0 ACRE IN SIZE. WHEN PART OR ALL OF A FIXED OR VARIABLE-RADIUS PLOT FALLS WITHIN A NONFOREST INCLUSION, THE INCLUSION IS SAMPLED AS PART OF THE SURROUNDING FOREST LAND.

NONSTOCKABLE: A FOREST LAND CONDITION CLASS IS NONSTOCKED IF: 1) THE AVERAGE DIAMETER OF LIVE TREES IN THE CONDITION CLASS IS <5.O IN. D.B.H. AND <100 FREE-TO-GROW SEEDLINGS AND SAPLINGS PER ACRE ARE DISTRIBUTED BROADLY ACROSS THE CONDITION CLASS. OR: 2) THE AVERAGE DIAMETER OF LIVE TREES IN THE CONDITION CLASS IS ≥5.0 IN. D.B.H. AND TREE CANOPY COVER IS < 10 PERCENT. OR: 3) THE CONDITION CLASS WAS RECENTLY CLEARCUT AND HAS NOT BEEN REPLANTED.

PASTURE: PASTURE IS RANGELAND THAT HAS BE PLOWED AND ARTIFICIALLY SEEDED TO GRASS OR OTHER FORAGE SPECIES LIKE CLOVER TO FEED DOMESTIC LIVESTOCK. OFTEN, IT IS IRRIGATED AND FENCED.

PC: PLOT CENTER. THE FIELD GRID LOCATION ON THE GROUND FOR EACH FIELD PLOT. ON ESTABLISHED PLOTS VISITED AT OC3, PLOT CENTER IS AT THE OC3 CEDAR STAKE. ON MISSING OR LOST PLOTS, PLOT CENTER IS THE PINPRICKED LOCATION ON THE OC3 PLOT PHOTOS. ON NEW PLOTS, PLOT CENTER IS THE PINPRICKED LOCATION ON THE OC4 PLOT PHOTOS.

PI: PHOTO INTERPRETATION.

POLETIMBER: A TREE 5.0 TO 8.9 IN. D.B.H.

POLETIMBER STAND A STAND IN WHICH THE AVERAGE DIAMETER OF THE TREES PRESENT IS 5.0 TO 8.9 in. D.B.H.

PRODUCTION CREW A CREW CONTAINING AT LEAST ONE CERTIFIED INDIVIDUAL. THE CREW IS INVOLVED IN ROUTINE INSTALLATION OF PLOTS.

PRODUCTION PLOT A PLOT THAT BELONGS TO THE 6000-ACRE GRID DATABASE. IT MAY ALSO BE USED FOR TRAINING PURPOSES.

RANGELAND: LAND DOMINATED BY NATURAL PLANT COVER COMPOSED PRINCIPALLY OF NATIVE OR EXOTIC GRASSES, FORBS, OR SHRUBS. NATURAL RANGELAND IS UNIMPROVED, I.E., IT IS NOT IRRIGATED, AND HAS NOT BEEN SEEDED ARTIFICIALLY.

REGENERATION STATUS A STAND DESCRIPTOR THAT INDICATES WHETHER A STAND HAS BEEN NATURALLY OR ARTIFICIALLY REGENERATED.

REGIONAL DRIFT	THE TENDENCY FOR STANDARDS, METHODS AND INTERPRETATIONS TO DRIFT APART OVER TIME AS EACH UNIT IMPLEMENTS THE FIA CORE PROTOCOL.
REGENERATION:	A YOUNG, PRECOMMERCIAL-SIZED STAND, OR THE UNDERSTORY TREE COMPONENT OF A MULTISTORIED STAND.
RELASKOP	AN INSTRUMENT USED TO ESTIMATE TREE DIAMETERS FROM A DISTANCE
RELEASE:	FREEING A TREE FROM IMMEDIATE COMPETITION BY REMOVING OTHER TREE OR NONTREE COMPETITION.
RESIDUAL OVERSTORY:	A TREE THAT HAS SURVIVED FROM THE PREVIOUS STAND AND IS USUALLY LARGER OR OLDER THAN TREES WHICH ORIGINATED AS PART OF THE PRESENT STAND.
ROT:	DECAY. DECOMPOSITION OF WOOD BY FUNGI OR BACTERIA.
ROUNDWOOD:	SECTIONS OF TREE STEMS, WITH OR WITHOUT BARK. INCLUDES LOGS, BOLTS, POSTS, PILINGS AND OTHER PRODUCTS STILL "IN THE ROUND".
RP:	REFERENCE POINT. AN OBJECT (USUALLY A TREE), WHICH CAN BE LOCATED ON THE GROUND AND IDENTIFIED ON THE PHOTO. IT WILL BE TAGGED AND REFERENCED TO THE CEDAR STAKE IN ORDER TO FACILITATE RELOCATING THE PLOT.
SAPLING:	A TREE 1.0 TO 4.9 IN. D.B.H.
SAPWOOD:	THE OUTER LAYERS OF WOOD BETWEEN THE HEARTWOOD AND INNER BARK. GENERALLY LIGHTER IN COLOR THAN HEARTWOOD.
SAWTIMBER STAND, SMALL	A STAND IN WHICH THE AVERAGE DIAMETER OF THE LIVE TREES PRESENT IS 9.0 TO 21.0 IN. D.B.H.
SAWTIMBER STAND, LARGE	A STAND IN WHICH THE AVERAGE DIAMETER OF THE LIVE TREES PRESENT IS GREATER THAN 21.0 IN. D.B.H.
SDI	STAND DENSITY INDEX.
SEEDLING:	A LIVE TREE LESS THAN 1.0 IN. D.B.H. THAT IS AT LEAST 0.5 FEET IN HEIGHT (CONIFERS) OR 1.0 FEET IN HEIGHT (HARDWOODS) AND ESTABLISHED IN MINERAL SOIL.
SEEDLING-SAPLING STAND	A STAND IN WHICH THE AVERAGE DIAMETER OF THE LIVE TREES PRESENT IS LESS THAN 5.O IN. D.B.H.

SILVICULTURE:	THE SCIENCE AND PRACTICE OF GROWING AND TENDING FOREST CROPS FOR SPECIFIED OBJECTIVES.
SITE:	THE AGGREGATE OF ALL ENVIRONMENTAL CONDITIONS AFFECTING THE SURVIVAL AND GROWTH OF A PLANT COMMUNITY ON A SPECIFIC AREA.
SITE CLASS:	A CLASSIFICATION OF POTENTIAL AVERAGE ANNUAL ABILITY OF A FOREST LAND SITE TO PRODUCE WOOD--FOR THE PERIOD BETWEEN THE TIME OF STAND ESTABLISHMENT AND THE TIME WHEN AVERAGE ANNUAL WOOD PRODUCTION PEAKS-- WERE THE SITE FULLY STOCKED WITH DESIRABLE TREES.
SITE INDEX:	A MEASURE OF PRODUCTIVITY INHERENT ON A FOREST SITE THAT IS SIMPLE NUMERICAL VALUE BASED UPON TREE HEIGHT AT A SPECIFIED AGE.
SLOPE DISTANCE	THE AMOUNT OF SEPARATION BETWEEN 2 POINTS AS MEASURED ALONG AN INCLINE. SLOPE DISTANCE = HORIZONTAL DISTANCE WHEN THE % SLOPE BETWEEN THE 2 POINTS IS ZERO. WHEN MEASURING SLOPE DISTANCE FOR REFERENCE TREES, SLOPE DISTANCE IS MEASURED FROM THE HEAD OF THE NAIL AT THE BASE OF THE TREE TO SUBPLOT CENTER
SNAG:	A STANDING DEAD TREE. IN THE CURRENT INVENTORY, A SNAG MUST BE ≥5.O IN. DBH AND ≥4.5 FEET TALL, AND HAVE A BOLE WHICH DOES NOT TOUCH THE GROUND. A SNAG MAY BE EITHER SELF-SUPPORTED BY ITS ROOTS, OR SUPPORTED BY ANOTHER TREE OR SNAG.
SOFTWOODS:	CONIFEROUS TREES, USUALLY EVERGREEN, HAVING NEEDLE OR SCALE-LIKE LEAVES.
SPRIG	ANY WOODY OR NON-WOODY LATERAL GROWTH, WITHOUT SECONDARY BRANCHING, LESS THAN 1.0 INCH IN DIAMETER AT THE BASE ABOVE THE SWELLING AT THE POINT OF ATTACHMENT TO A BRANCH OR CROWN STEM.
STAND AGE:	THE TOTAL AGE OF A FOREST STAND THAT BEST CHARACTERIZED THE STAND. STANDS ARE EVEN- OR UNEVEN-AGED.
STANDING DEAD TREE:	SEE SNAG.
STAND DENSITY INDEX:	THE MAXIMUM NUMBER OF TREES PER UNIT AREA A FOREST SITE WILL SUPPORT WHEN THE STAND D.B.H. IS 10 INCHES RELATIVE TO

	THE MAXIMUM EXPECTED NUMBER IF THE SITE WERE CAPABLE OF SUPPORTING A NORMAL STAND.
STAND SIZE:	A CLASSIFICATION OF STANDS BASED ON TREE SIZE. STAND SIZES ARE LARGE SAWTIMBER, SMALL SAWTIMBER, POLETIMBER, AND SEEDLING-SAPLING STANDS. IF LESS THAN 10 PERCENT STOCKED WITH LIVE TREES, THE SITE IS CALLED NONSTOCKED.
STOCKING:	A QUALITATIVE EXPRESSION BASED ON COMPARING THE EXISTING NUMBER OF TREES PRESENT ON A FOREST SITE TO THE NUMBER NEEDED TO ACHIEVE THE MOST OPTIMAL GROWTH, VOLUME, OR VALUE POSSIBLE ON THE SITE.
SUNSCALD:	DAMAGE TO THE CAMBIUM CAUSED BY OVEREXPOSURE TO SUN.
SWEEP:	A BROAD ARC IN A BOLE OR LOG. A SOUND CULL DEFECT.
TALLY TREE	A TREE, SAPLING, OR SEEDLING THAT IS SELECTED TO BE MEASURED ACCORDING TO THE RULES IN THIS MANUAL.
TERMINAL LEADER:	THE TOPMOST SHOOT OF A TREE.
TRACHEID:	PART OF WOOD STRUCTURE: A LONG, TUBELIKE CELL IN WOOD TISSUE.
TRACKABLE TREE:	A SAMPLED TREE THAT IS REFERENCED AND REMEASURED IN SUCCESSIVE INVENTORIES ON PERMANENT PLOTS.
TRAINING PLOT	A PLOT ESTABLISHED FOR TRAINING OR CERTIFICATION PURPOSES ONLY. IT DOES NOT BELONG TO THE 6000-ACRE GRID DATABASE.
TREE	A TREE IS A WOODY PLANT THAT HAS AN ERECT PERENNIAL STEM OR TRUNK AT MATURITY THAT IS AT LEAST 3.0 IN. DIAMETER AT BREAST HEIGHT (4.5 FEET) AND A TOTAL HEIGHT OF AT LEAST 12 FEET. (Ag. Handbook No. 541, 1979, ed., p. 3).
TWIG	ANY WOODY LATERAL GROWTH, WITH SECONDARY BRANCHING, LESS THAN 1.0 INCH IN DIAMETER AT THE BASE ABOVE THE SWELLING AT THE POINT OF ATTACHMENT TO A BRANCH OR CROWN STEM.
UNEVEN-AGED STAND:	A STAND THAT IS NOT CLASSIFIED AS NONSTOCKED AND THAT HAS LESS THAN 70 PERCENT OF THE TREES PRESENT WITHIN 30 YEARS OF ONE ANOTHER IN TOTAL AGE.
WILT:	DROOPING OF FOLIAGE; OFTEN A DISEASE SYMPTOM.

APPENDIX 19 – PROCEDURAL SUPPLEMENT

Section	Interpretation
Appendix 20 Glossary	In 2011, the crew used the definition of a 'maintained/improved road' found in the PNW manual: 2011 PNW Manual pg 459: Improved road - Paved roads, gravel roads, or improved dirt roads regularly maintained for longterm continuing use by **normal passenger vehicles**. Generally constructed using machinery. The area where the original topography has been disturbed by cutbanks and fill is considered part of the road, if that area is maintained. Unimproved traces and roads created for skidding logs are not considered improved roads. Thus in 2011, they did not map roads which were very rough and rocky and could be driven by 4x4 vehicles. In 2012 and beyond we will map roads that could be driven by a 'large vehicle.' HI Manual 2014 pg 267: MAINTAINED ROAD: ANY ROAD, HARD TOPPED OR OTHER SURFACES, THAT IS PLOWED OR GRADED PERIODICALLY AND CAPABLE OF USE **BY A LARGE VEHICLE**. RIGHTS-OF-WAY THAT ARE CUT OR TREATED TO LIMIT HERBACEOUS GROWTH ARE INCLUDED IN THIS AREA.

APPENDIX 20 – BLANK PAGES FOR NOTES